SKF Analysis and Reporting Manager

Reporting and Analysis Support Software
Version 2.0

Part No. 32296900-EN
Revision A

User Manual

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1
About Analysis and Reporting Manager Software

The Analysis and Reporting Manager Software (ARM) provides graphical displays and Word reports of SKF Microlog data (e.g., Time Signal, Tracking, Transfer Function, Check-to-conformance, etc.).

2
General Window Operations

Using the Main Window

The ARM main window is divided into two separate panels. Using your mouse, right-click anywhere in either panel to access a context menu based on your current selection. Each panel has its own customizable toolbar.

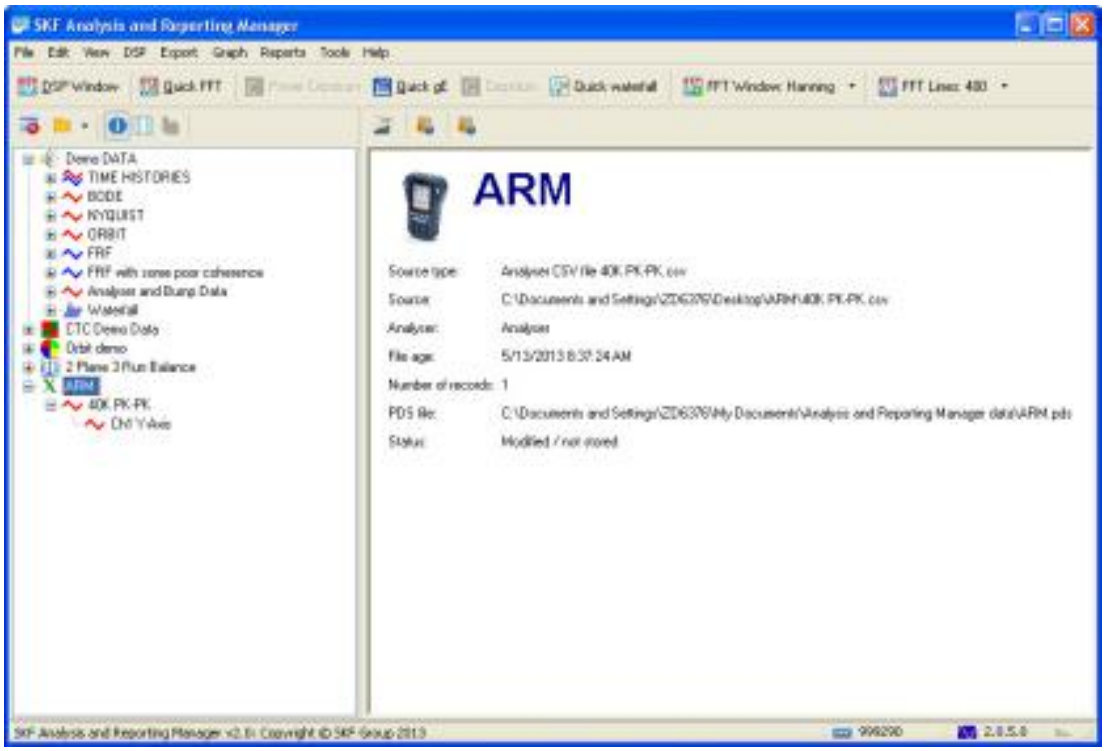

Figure 2 - 1.
Main Window.

Left panel – The left panel displays the hierarchical tree structure. The hierarchical structure is a list of contents of the uploaded Microlog module data files.

Working in the left panel – The hierarchical structure expands and contracts to show/hide individual branching items.

- Click the **+** or **–** icons, double-click an item, or use the **+** or **–** keyboard keys to expand or contract the active hierarchical structure.

The hierarchy organizes file types uploaded from the Microlog into groups.

Right panel – The right panel displays the contents of the currently selected item in the left panel. There are three available display options, depending on the hierarchy level selected in the left panel:

- **Source description** - Displays details of the selected group.
- **List** - Displays a list of the records for the selected group or file.

- **Graph** - Displays a plot of the selected file.

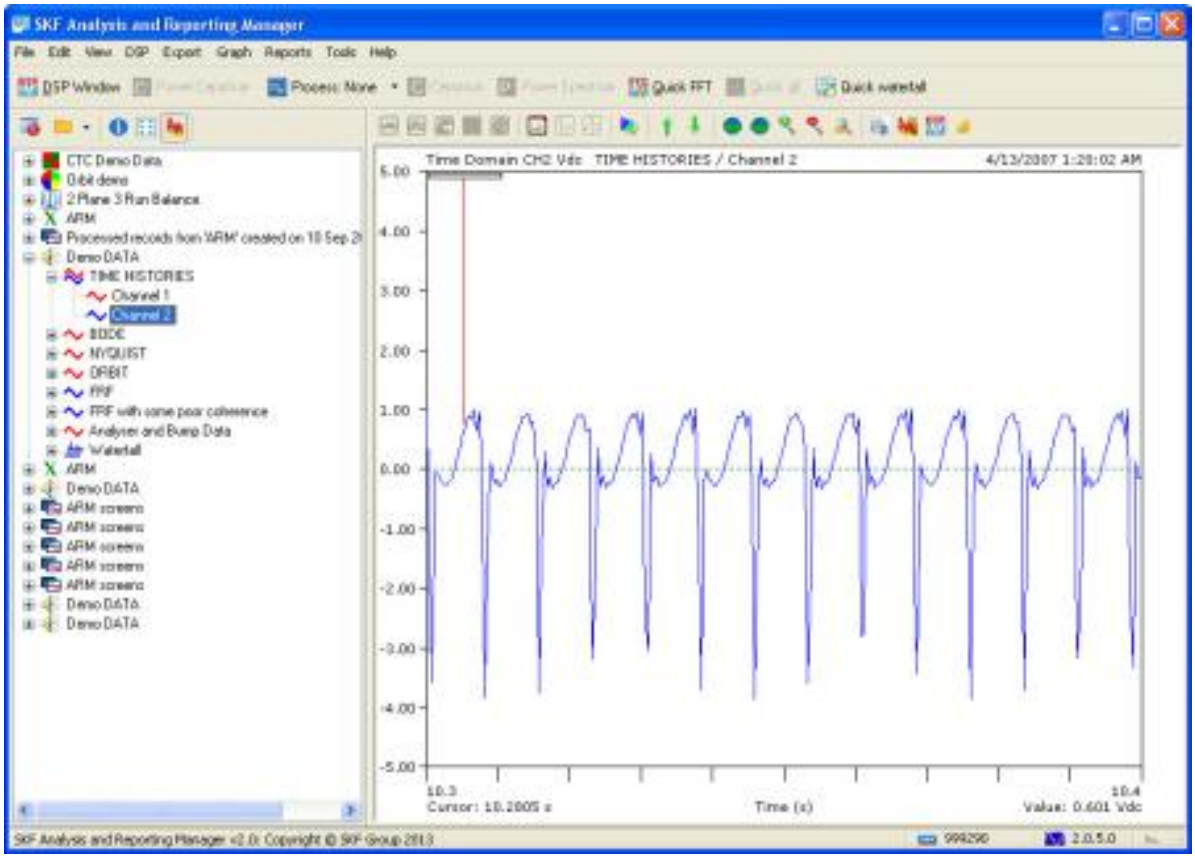

Figure 2 - 2.
Graph Display Option.

The main window's menu bar contains commands for manipulating the data and the plot, and controlling the program set up.

ARM Operational Overview

ARM performs two main operations:

- Uploading data
- Viewing data

Uploading Data

Upload data from your Microlog using ARM's **Mobile Device Viewer** wizard.

ARM automatically stores uploaded data in data files on your computer and updates them as you make changes. You may override these settings for full control over data storage and updates. When you exit ARM or close the hierarchy, it automatically saves to its data file, located in the ARM data directory. Open the data file from the open history list to view your data again.

Viewing Data

Viewing data in ARM allows you to plot the data graphically, manipulate the data via scaling, engineering units, add notes and annotations to the data, and export it in various forms, including ASCII file and graphic bitmaps.

Export data and graphic plots to Microsoft Word documents using template files and bookmarks. Design your document in Word and save it as a template file, using bookmarks to place text or graphics; then link these to a Word report in ARM.

Welcome Window

From the **Welcome** window, access the main program functions as follows.

Figure 2 - 3.
Welcome Window.

Transfer data - Upload data from your Analysis and Reporting Manager Software Microlog data collector and display it in ARM.

Open a data file - Open an existing ARM data stream or hex file, or some other file type, and display the data in ARM.

Tip of the day - Display the **Tip of the day window** before opening the ARM main window.

Other Data Commands

Use the following commands from the **File**, **Edit** and **DSP** menus to manipulate your data; some of these are also available from context menus over the left panel or plot.

Edit date and speed - Edit the date, time, and speed value of the data. Date values are stored at the trace level only; all records are affected within the selected object.

- The original date and time as captured still displays in certain object summaries.
- Changing this date may cause the automatic update routines to inform you that there is a difference compared to the original source data the next time you open the associated data stream file.

Rename - Rename any object in a data structure.

Reset - Restores all graph settings, engineering units and scaling options to their defaults when selecting a record or trace in the left panel.

View source - Displays source data in a summary window. Suitable source data includes hex data files, ASCII, UFF, and Excel.

Reprocess - Reprocesses the data from its original source, and discards all display settings, notes, annotations, and post-processing entered by the user. This option is only available when selecting a record with suitable source data (hex data files / analyzer binary files) in the left panel.

- This feature is only available if the program option for storing the source data in the data stream was set when the data was first loaded from its source file.

Data summary - Outputs a text summary and a full listing of the item's data to a summary window.

Delete - Delete the selected object; deletion is permanent and cannot be undone. You may wish to use the **Edit / Cut** command to move the object to another data structure instead.

Print - Prints the selected object; if a plot displays when you select an item, the plot prints, otherwise a text listing prints.

Print preview - Displays text in a **Print Preview** window.

Expand record - Expands single records containing transfer function data in real plus imaginary data format to draw Bode and polar plots. (Any trace in real plus imaginary format contains sufficient data to produce the dual channel display; this feature makes it possible to use the second display channel for another process, such as correlation or time-domain).

DSP window - Displays currently selected data in the ARM **Digital Signal Processing** window.

Quick FFT - Processes the currently selected data using the same settings as taken from the **Digital Signal Processing** window and immediately displays the results in a new record.

Context Menus

Context menus are available throughout ARM to perform various operations on selected objects.

Figure 2 - 4.
Select Objects.

To view a summary of an object in the list:

- Right-click the object. A menu displays.
- Select **Data summary**. The object summary displays in a summary window.

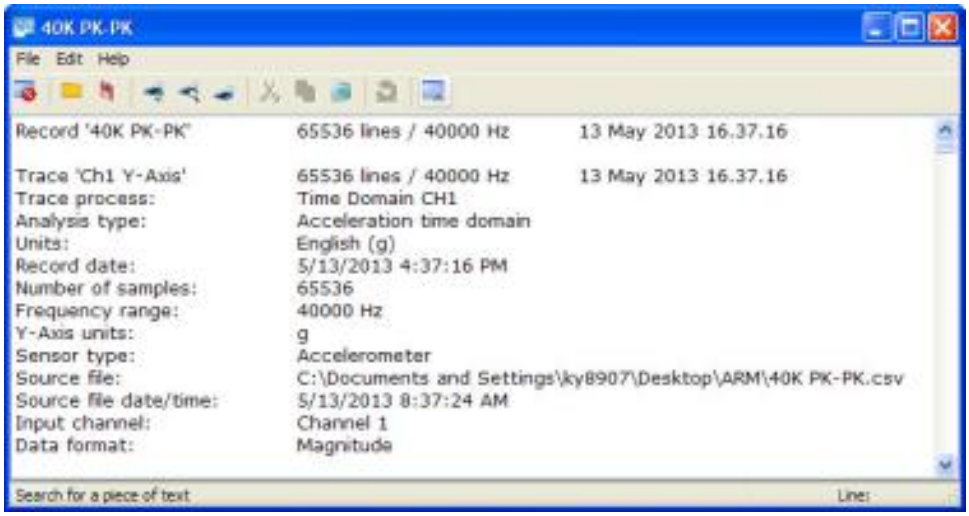

Figure 2 - 5.
Summary Window.

Select Path for Source

The **Select path** dialog displays when you are loading source data files into ARM by selection of **Open a source directory** from the **File** menu.

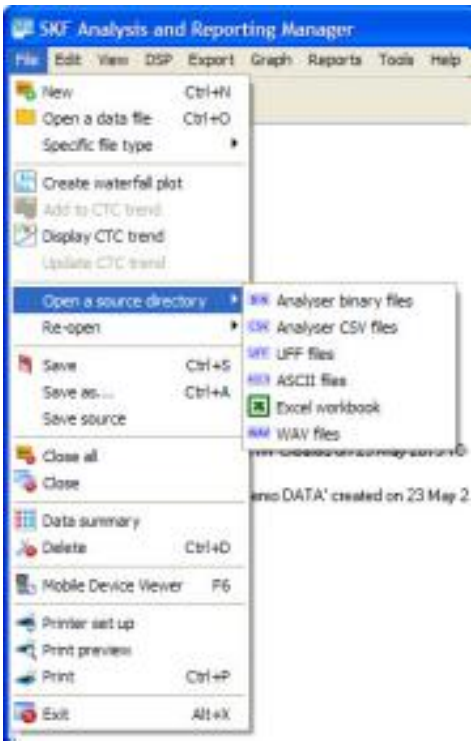

Figure 2 - 6.
Open a Source Directory.

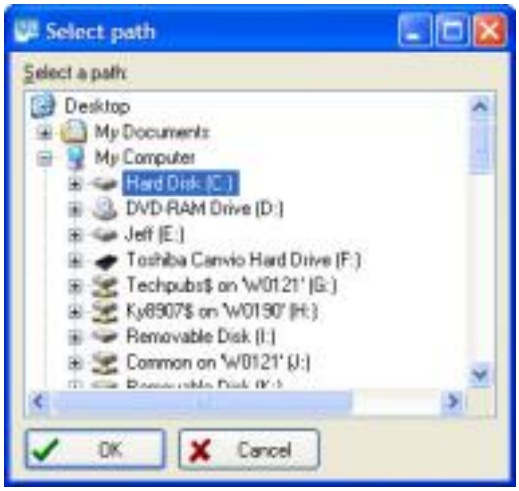

Figure 2 - 7.
Select Path Dialog.

To select the path:

- Select a folder from the **Folders** list.
- Click **OK**.

Difference between Source and Stream

Upon opening a data file or source directory, ARM performs checks to see if the file requires updating by comparing the data in the source files and the associated data stream file.

This comparison is based on the number of records and a comparison of the record names and their storage date/times. If ARM finds a difference, the **Difference between source and stream dialog** displays. Specify how ARM should proceed.

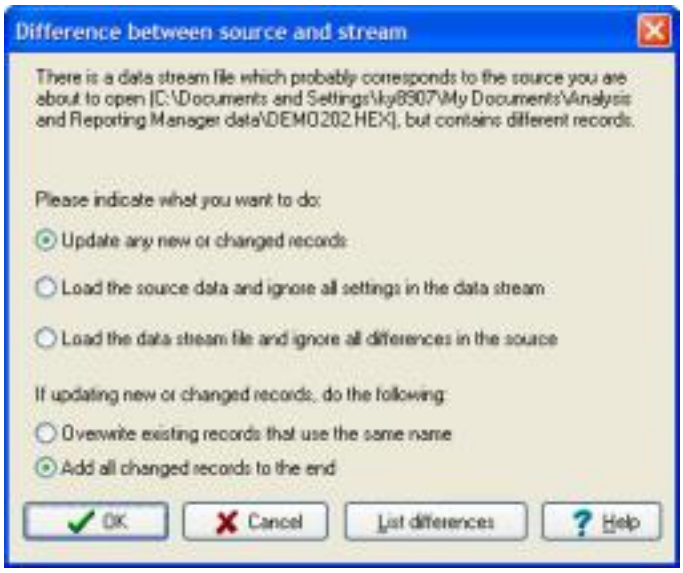

Figure 2 - 8.
Difference between Source and Stream Dialog.

Fields include:

Update any new or changed records - Adds changed records to the end or overwrites any with the same name. If opening a data stream file, the extra records are loaded from the source and added to it. If opening a source, the extra records are added from the data stream.

Load the source data and ignore all settings in the data stream - The source opens and overwrites all records in the data stream; all settings, such as notes, cursors and annotations, are lost.

Load the data stream file and ignore all differences in the source - Differences in the source are ignored and the data stream file opens.

Print Preview

Use the **Print Preview** window to show how reports will look when printed using the current printer.

You can save the report to file from this window.

A toolbar at the top of the window contains controls for changing the view of the report and for outputting to the printer or clipboard.

	Exit print preview. You may use keyboard commands: **Alt-X**, **Escape**, or **Alt-F4**.
	Whole page view.
	Page width view.
	Print size view.
	Go to first page. You may use keyboard commands: **Ctrl-PageUp**.
	Go to previous page. You may use keyboard commands: **PageUp**.
	Go to next page. You may use keyboard commands: **PageDown**.
	Go to last page. You may use keyboard commands: **Ctrl-PageDown**.
	Copy to clipboard. You may use keyboard commands: **Ctrl-Insert** or **Ctrl-C**.
	Print. The printer dialog displays. You may use keyboard commands: **Ctrl-P**.
	Display a special toolbar, containing controls for setting the page and zoom, and for saving and loading reports to and from file. You may use keyboard commands: **Ctrl-T**.
Special Toolbar Controls:	
	Select the page to view.
	Set the percentage zoom.
	Save the report to file. You may use keyboard commands: **F2** or **Ctrl-S**.
	Load a report from file. You may use keyboard commands: **F3** or **Ctrl-O**.

3
Data Transfer

Data Transfer Overview

ARM's **Mobile Device Viewer** wizard allows you to upload module data from your Microlog using Microsoft Active Sync under Windows.

- Under Windows 7, ActiveSync has been replaced by Windows Mobile Device Center.

Mobile Device Viewer

To upload data from your Microlog using the Mobile Device Viewer wizard:

- Establish a connection between your Microlog and ActiveSync.
  - Refer to Microsoft.com for more information about ActiveSync or Mobile Device Center communication. If you do not already have ActiveSync or Mobile Device Center installed, you may download it from here as well.
- Select the **File** menu's **Mobile Device Viewer** option from the main menu or press **F6**.

The **Mobile Device Viewer** wizard displays, allowing you to upload data files from your Microlog. Additionally, you may automatically export the uploaded data to ASCII, Excel, or UFF if enabled on the **Mobile Device Options** dialog.

Figure 3 - 1.
Mobile Device Viewer Wizard's Main Window.

- An **Options** button allows you to set additional processing options. Click to display the **Mobile Device Options** dialog. After making any necessary changes, click **OK** to return to the **Mobile Device Viewer** wizard's main window.

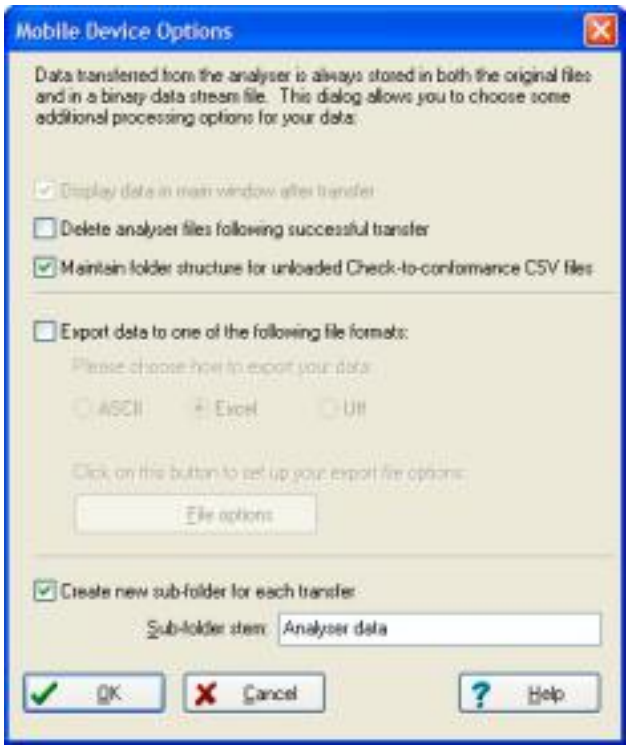

Figure 3 - 2.
Mobile Device Options Dialog.

Select options to process data uploaded from your Microlog:

Display data in main window after transfer – When enabled, ARM displays the transferred data in the main window.

Delete analyser files after successful transfer – When enabled, ARM deletes the files on the Microlog upon successful transfer.

Maintain folder structure for unloaded Check-to-conformance CSV files – When enabled, ARM maintains the Check-to-conformance results directory structure when uploading CCR files.

Export data to one of the following file formats – When enabled, ARM automatically exports the uploaded data to ASCII, Excel, or UFF file format. Select the output file format to which you wish to export.

Create new sub-folder for each transfer – When enabled, ARM writes each transfer to a new, unique sub-folder.

- The **File options** button allows you to set up file export options. Click to display the **Export format for...** dialog. After making any necessary changes, click **OK** to return to the **Mobile Device Options** dialog.
- Click **Next**. The **Connection** window displays, where you can select files to upload from the Microlog and view the Microlog's status.

Figure 3 - 3.
Mobile Device Viewer Connection Window.

Mobile Device Viewer: Connection

When the **Connection** window displays, ARM automatically attempts to establish a connection with your Microlog using ActiveSync. If connection fails, make sure your Microlog / ActiveSync connection still exists.

Once connection is established, ARM displays a list of all available files for upload in the list box.

Use the **Source** button to filter the types of files you would like to view; when you change this selection the file list automatically updates.

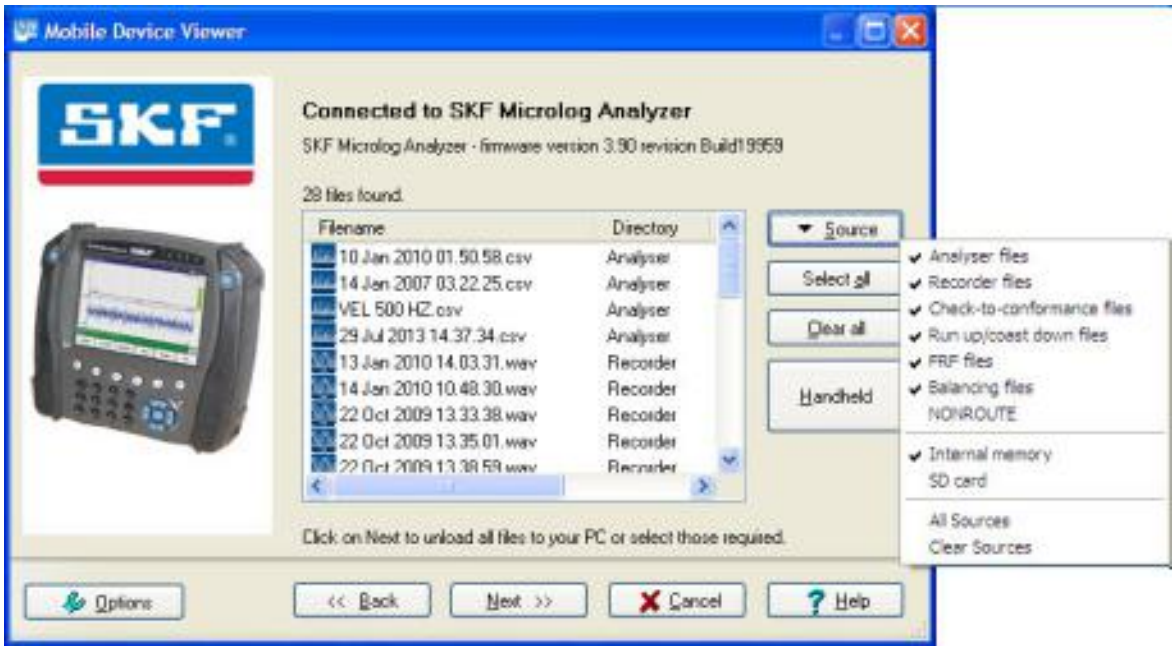

Figure 3 - 4.
Filter Types of Files.

Uploading Files from the Microlog

To upload files from the Microlog:

- Select the files you wish to upload. **Select All**, **Clear All**, **Shift+click**, and **Ctrl+click** options are available for multiple selection.
- To unload all displayed files, leave all files unselected.
- Click **Next**. The **Data Transfer** dialog displays upload progress.

Viewing Microlog Status

To view the Microlog's status:

- Click the **Handheld** button. An **Information** dialog displays the Microlog's version, memory used and memory remaining, battery status, etc.
- Click **OK** to return to the **Connection** page.

Mobile Device Viewer: Data Transfer

The **Data transfer** window displays the progress of the upload.

Figure 3 - 5.
Mobile Device Viewer's **Data Transfer** Window.

To cancel the upload:

- Click **Cancel**. You are prompted to confirm that you wish to cancel the upload.
- Click **Yes**. The **Transfer stopped** page displays.

Mobile Device Viewer: Transfer Stopped

The **Transfer stopped** page displays if an error occurs during the upload or if you click the **Cancel** button during the upload. A summary displays the reason why the upload stopped.

- Click **Back** to start the upload process again, or **Close** to exit the **Mobile Device Viewer** wizard.

Mobile Device Viewer: Transfer Complete

When all files have successfully uploaded, the **Transfer Complete** window displays and provides a summary of the files uploaded and processed.

- Click **Close** to return to the main ARM window; the data displays as a new hierarchy group.

Figure 3 - 6.
Mobile Device Viewer's **Transfer Complete** Window.

➢ After ARM installation, a unique folder structure is created that ARM uses for the uploaded measurement data for analysis purpose. You will find this folder structure under:
C:\Documents and Settings\user\My Documents\Analysis and Reporting Manager Data
It contains subfolders such as "Report Templates", "Measured Data", "Sample Data", and "Processed Data".

4
Plots

Plots Overview

ARM plots allow you to manipulate both the data and the plot used to present your data.

To display a plot:

- Select a record from the hierarchy in the left panel. A plot displays in the right panel.

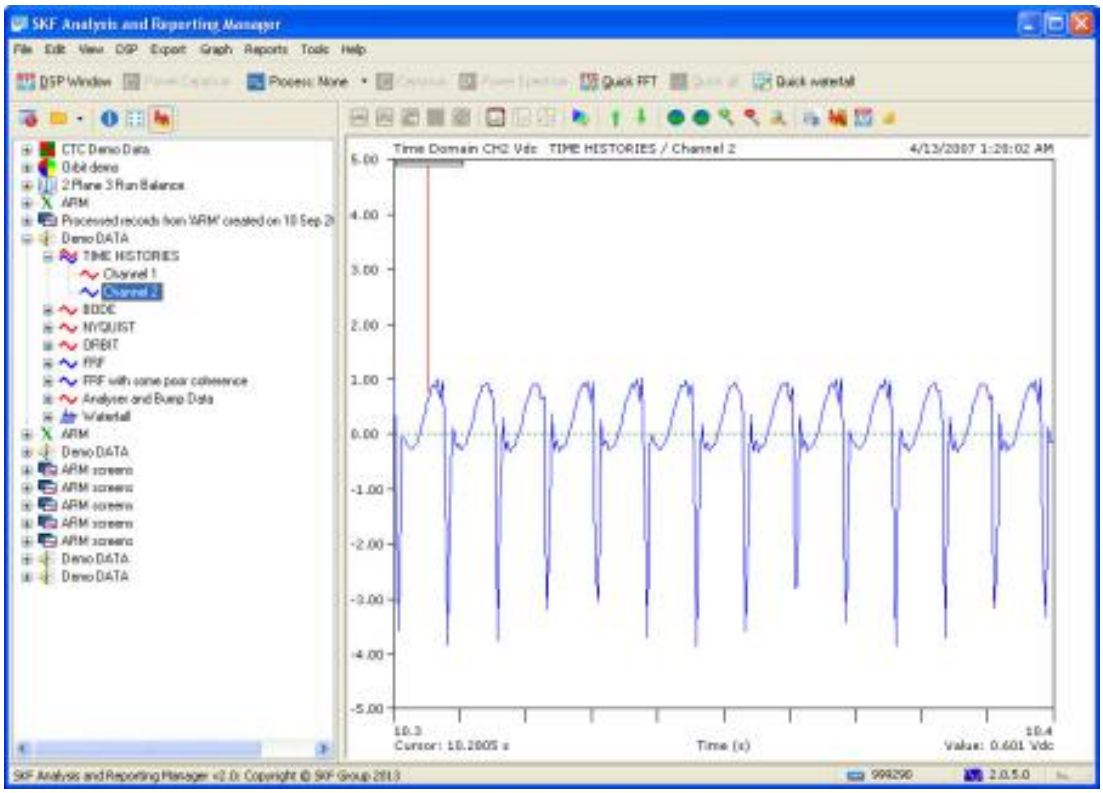

Figure 4 - 1.
Plot Display.

Select the full record level to display all the traces for a group (e.g., a waterfall or dual spectrum display) or an individual record to display a single record within the group. Depending on the selected record, applicable plot options are enabled on the **Graph** menu and toolbar.

To select a plot type:

- Select the **Graph** menu's **Change plot type** option.

To display a record in a separate window:

- Select the **View** menu's **View in a new graph window** option.

To customize the appearance of graph plots:

- Select the **Graph** menu's **Display styles / Edit Display style** option.

Graph menu

Use the **Graph** menu to customize how data displays in a plot; the following options display depending on the type of record you select.

Figure 4 - 2.
Graph Menu.

Cursor - Select a dynamic cursor to display on the plot.

X-axis - Select **Hz**, **CPM**, or **Orders** when displaying frequency domain data; for data not captured in Orders, you can enter a speed value to view data in Orders. You may also set a high-pass filter here, defined in Hz.

Y-axis:

Scale - Select linear, log dB, log magnitude, and real, imaginary, and phase scales; you can also define a dB reference value and dB range for the vertical scale.

Engineering units - Choose to display data that is in standard engineering units in English or Metric systems. You can also define the detection settings of your data (RMS, Peak or Peak-to-peak).

Add integrations - Select to apply Auto EUs to data not captured in that way originally, and will integrate or differentiate the data accordingly.

RMS, **Peak** and **Peak-to-peak** - Select the detection setting of your data in RMS, Peak or Peak-to-peak.

Integrate - Select to integrate any frequency domain data that uses evenly spaced x-axis values.

Differentiate - Select to differentiate any frequency domain data that uses evenly spaced x-axis values.

Zooming - Access zooming and panning options, or display the **Enter axis range** dialog to specify.

Scaling - This submenu contains similar commands as for **Zooming**, but applied to the vertical axis.

- You can control both the horizontal and vertical display ranges by Ctrl-dragging with the mouse on the plot. A rectangle is continuously drawn displaying the ranges (the numerical values show on the status panel); upon release, the plot redraws to these limits.

Change plot type - Select the plot type to display.

Orbit, polar and Nyquist options - Select an orbit plot type to display, specify the x-channel probe angle, and swap the axes on orbit plots.

Annotations - Create, edit, or delete annotations.

Control all - When displaying multiple plots, **Control all** allows you to toggle between controlling records individually or together.

Full window - Select to expand the graph to occupy the full ARM main window, hiding the left panel.

Display styles - Opens the **Display style editor**.

Multiple plot / waterfall ranges - Opens the **Choose records to include** dialog. For multiple plots, including waterfalls, choose or omit any records from the display.

Waterfall options - Displays options for changing waterfall or overlay plots.

Reverse waterfall - Reverses the order that the records are drawn, moving the back record to the front and the front to the back, etc.

Change Z-Axis Information - Choose the z-axis information used to display waterfalls; some modules, such as Run up / Coast down, return a number of z-axis parameters, such as speed or time. If the waterfall is plotted proportionally, the spacing changes by changing this setting.

Waterfall blanking - Specify a percentage blanking value to apply to your spectral data, allowing you to hide low level information to clarify the plot.

Remove DC offset - For time domain data, ARM removes the DC offset from the data; the average value of the series is calculated and this value removed.

Within the **Graphs** submenus, e.g., x-axis and y-axis entries, you can find several plot options that refer to the following sections.

Enter the Probe Angle

On the **Enter the probe angle** dialog, select the channel 1 (X) probe angle for your data. The probe angle is defined in degrees and is measured counter-clockwise, with zero degrees being at 3 o'clock.

Figure 4 - 3.
Enter the Probe Angle Dialog.

To define the probe angle:

- Enter the probe angle required.
- Click **OK**. ARM redraws and rotates the plot to include the defined probe angle.

Enter a High-Pass Filter

On the **Enter a high-pass filter** dialog, specify a non-destructive high-pass filter for plots showing data in frequency domain units. This "zeros" all spectral bins with a frequency point at or below the specified filter value, and recalculates the signature maximum value.

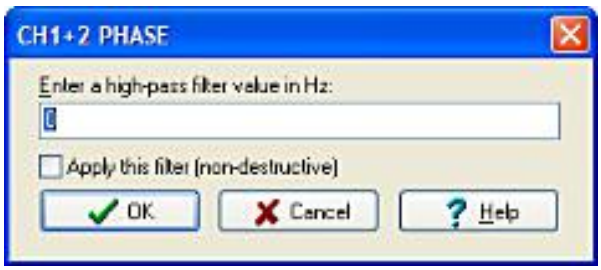

Figure 4 - 4.
Enter a High-Pass Filter Dialog.

To apply the high-pass filter:

- Enter the high-pass filter value in the **Enter a high-pass filter value** text box.
- Enable the **Apply this filter** checkbox.
- Click **OK**.

To disable the high-pass filter, yet retain the frequency value:

➢ Any changes made to the value in the **Enter a high-pass filter value** control are not applied.

- Disable **Apply this filter** checkbox.
- Click **OK**.

Enter a dB Reference

On the **Enter a dB reference** dialog, specify any reference value (in terms of the current units) to be used in calculating the dB values.

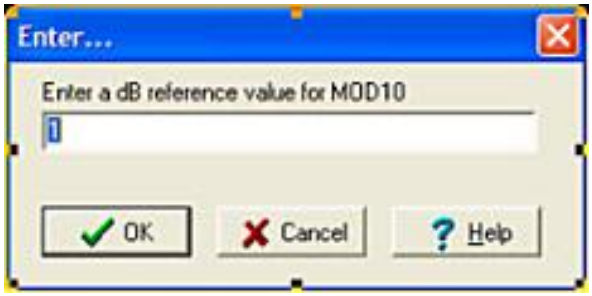

Figure 4 - 5.
Enter a dB Reference Dialog.

- Enter a reference value.
- Click **OK.**

Enter a dB Range

On the **Enter a dB range** dialog, specify the dB range for any plot. For plots using the Decibel scale, ARM defaults to using an initial dB range on the plot matching the notional dynamic range of the Microlog (typically 80 dB or 160 dB for 32-bit frequency response data).

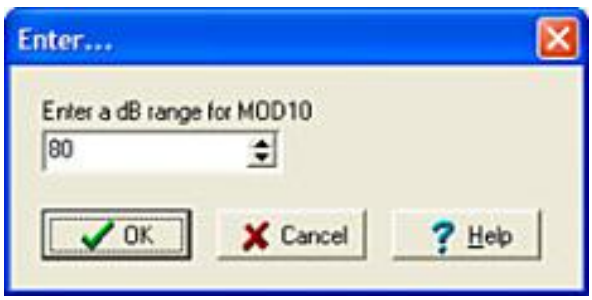

Figure 4 - 6.
Enter a dB Range Dialog.

To set the dB range:

- Enter a positive number (20 or higher).
- Click **OK.**
    - ➢ When magnifying or reducing the vertical scale on dB plots, the vertical range does not change (unlike in linear plots). Instead, the displayed range goes up or down by 10 dB.

Enter Speed

On the **Enter speed** dialog, specify the speed (in rpm) for plots showing data in frequency domain units in orders, if the data was not originally captured using order tracking.

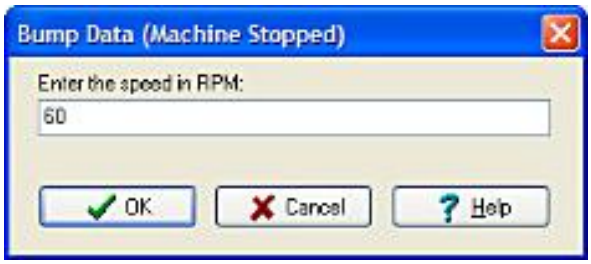

Figure 4 - 7.
Enter Speed Dialog.

For example, if the machine was running at 60 rpm, you would enter a speed of 60.

- Enter the speed required and click **OK**.

Plot Window

The plot window allows you to view any ARM data in a separate, floating window.

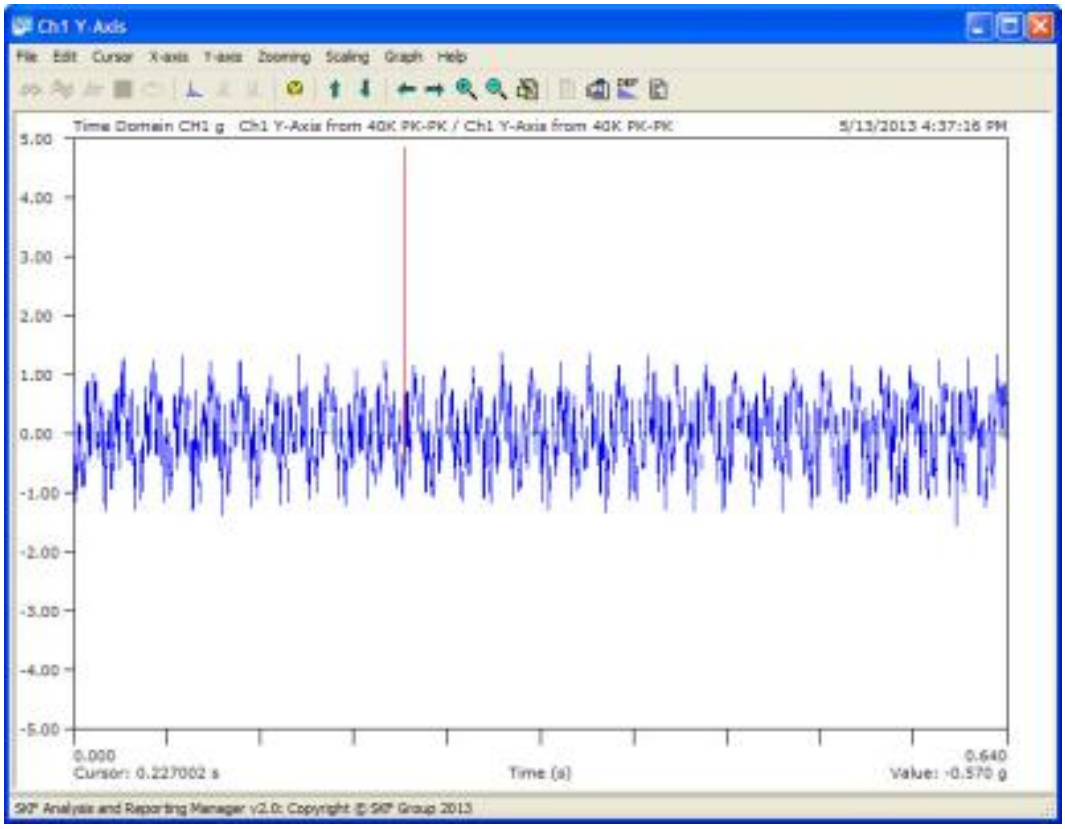

Figure 4 - 8.
Plot Window.

To view a record in a new plot window:

- Select the record in the hierarchy and choose the **View** menu's **View in a new graph window** option. A new plot window displays.
    - ➢ Data displayed in each plot window is a separate copy of the record selected in the main window. Any changes made to this data do not reflect in the original source, unless you choose the **File** menu's **Save to source** option.

When you close this window, if you have made any changes to the data, ARM prompts you to update this data back to the source in the main window. If you choose **Yes**, the record in the graphical display window overwrites the original source.

- ➢ You can only save to the original source if it is still open on the ARM main window. Also, if you open the same record in two graphical display windows and save from one, you will not be able to save from the other.

To save the data directly to an ARM data stream file:

- Select the **File** menu's **Save as** option.

Choose Records to Include

On the **Choose records to include** dialog, select which traces to include in the multiple display for the current record.

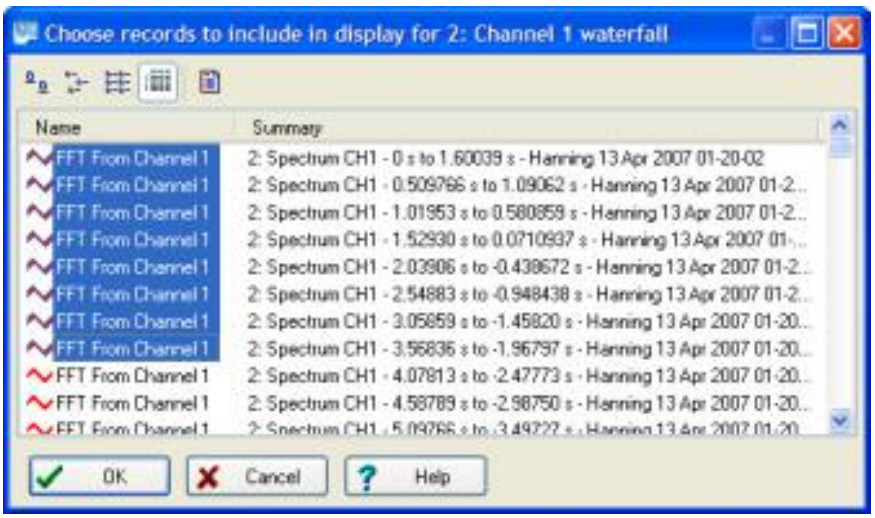

Figure 4 - 9.
Choose Records to Include Dialog.

To include a record in the plot:

- Select the **Graph** menu's **Multiple plot ranges** option. The **Choose records to include** dialog displays.
- Select at least one record. Use the standard Windows multiple selection commands to make your choices.
- Click **OK**.

Update Back to Source

The **Update back to source** dialog displays when you try to close a window in which you have made changes to the data.

ARM prompts you to update this data back to the source in the main window.

- Click **Yes** to record data in the plot window and overwrite the original source.
- Click **No** to discard changes made to this data.
- Click **Cancel** to return to the plot window.
    - ➢ You can only save back to the original source when it is still open on the ARM main window.

To save the data directly to an ARM data stream file:

- Select the **File** menu's **Save as** option on the graphical display window.

Plot Control

When displaying a record or plot containing more than one trace, you may control the traces simultaneously if the traces are similar (same analysis type, number of lines and frequency range). For example, positioning the cursor or setting zoom on one plot updates all plots in the same way.

To control all plots together in this way, enable the **Control all** option on the **Graph** menu. This setting is enabled by default in all suitable records.

If no traces in the record or display are similar, the **Control all** option is disabled. If you enable the **Control all** option with a display whose plots have different settings, changing any setting forces all plots to conform. For example, if the plots show different zoom magnification levels and you choose **Reset zoom**, all plots reset.

- ➢ If the plots are similar in all but the data type (amplitude units), **Control all** affects everything except the vertical scale / magnification settings.

Full Window Display

On the main window, you can temporarily hide the left panel, so the graph plot occupies the full window.

To temporarily hide the left panel and only display the graph:

- Enable the **Full window** option on the **Graph** menu or press **F11**.

When in full window view, most commands are still available, although the cursor keys only operate on the graph, even if the **Send key presses to the graph plot setting** is enabled on the **Program options** dialog.

- To revert to the normal display, disable the **Full window** option.

Display Style Editor

Display Style Editor Overview

The **Display style editor** allows you to modify the current plot's colors, fonts, cursor styles, and more.

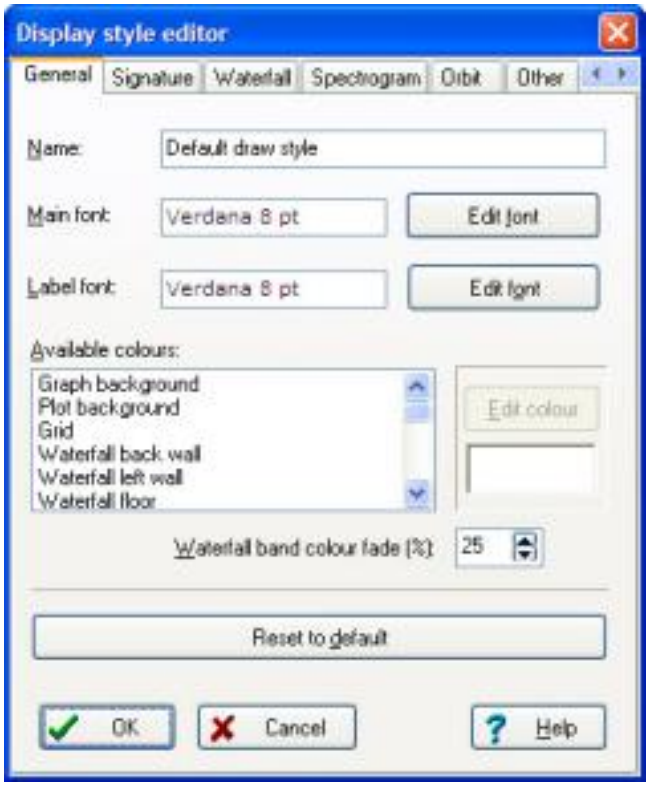

Figure 4 - 10.
Display Style Editor.

To open the Display Style Editor:

- Right-click the current plot and select **Edit display style**, or select the **Graph** menu's **Display styles** option.

The plot automatically reflects changes as they are made.

- Click **Cancel** to discard the changes.

Display Style Editor – General Tab

The **General** tab defines the current fonts and colors of various plot elements.

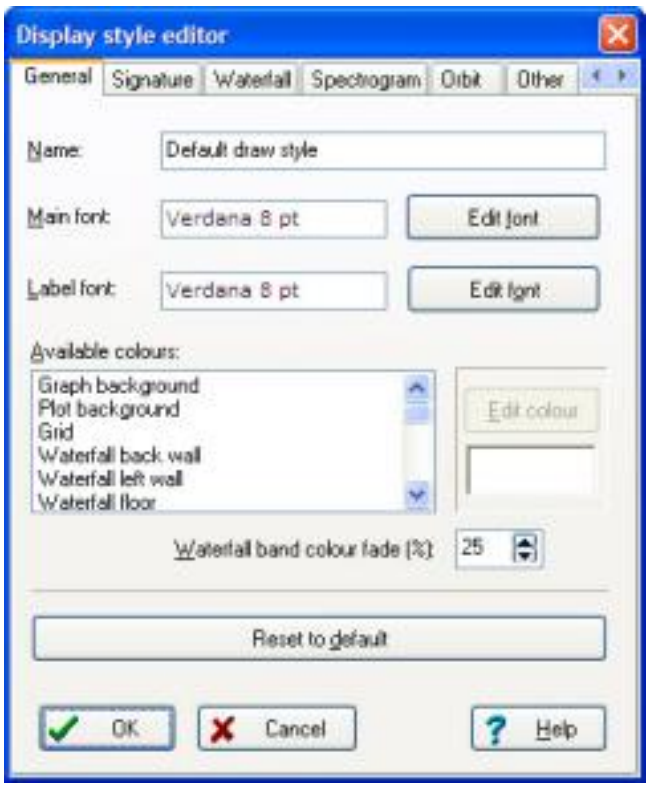

Figure 4 - 11.
Display Style Editor – General Tab.

Fields include:

Name - Enter the name of the display style. The name identifies the style when selecting display styles from the **Select objects** dialog.

Main font - Displays the current font used for most labeling on plots. Click **Edit font** to select a different typeface, style, and size.

Label font - Displays the current font used for cursor labeling. Click **Edit font** to select a different typeface, style, and size.

- ARM ignores the color selection on the **Edit font** dialog, since there are separate selections for color elsewhere.
- Non-TrueType fonts may not display properly.

Available colors - Displays a list of each plot element. A selected item's current color displays in the color panel below the **Edit color** button. Click the **Edit color** button to select a different color.

Waterfall band color fade - Specify a percentage color fade to apply to the bounding zone drawn on the plot.

Reset to default - Click to reset all styles to default.

Display Style Editor – Signature Tab

The **Signature** tab defines the style used to draw single signature plots.

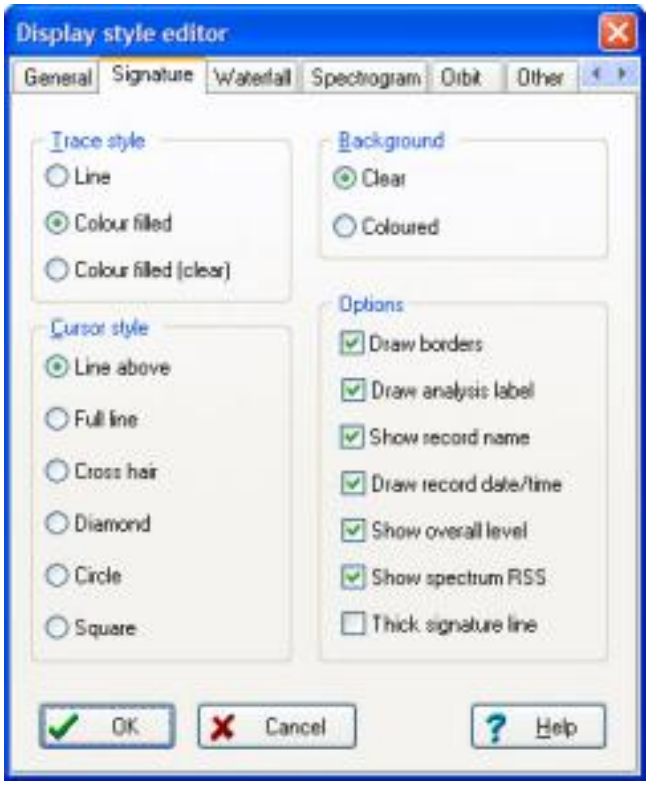

Figure 4 - 12.
Display Style Editor – Signature Tab.

Fields include:

Trace style area:

Line - No color fill is added below the line.

Color filled - Fills the area below the line with a specific color (**Spectral fill** on the **General** colors list).

Color filled (clear) - Fills the area below the line with the same color as the general graph area.

Background area:

Clear - Plots use the same background color as the general graph area.

Colored - Plots use a separate color (plot background on the general colors list).

Cursor style area:

Line above - Cursor line is vertical, starting just above the trace line and running to just below the top of the plot.

Full line - Cursor line runs the full height of the plot.

Cross hair, **Diamond**, **Circle**, and **Square** - Cursor appears as the selected shape.

Options area:

Draw borders - When enabled, all plots are bound by a rectangle; otherwise, there are no border or grid lines, and the plot background color is not used.

Draw analysis label, **Show record name**, **Draw record date/time**, **Show overall level** and **Show spectrum RSS** - When enabled, these labels are drawn at the top of the plot; note that the program checks the available space and only outputs those that fit. If the labels do not display, increase the window's size or reduce the font's size.

Thick signature line - When enabled, a double width line plots the signature or waveform line.

Display Style Editor – Waterfall Tab

The **Waterfall** page defines the style used to draw waterfall or map plots.

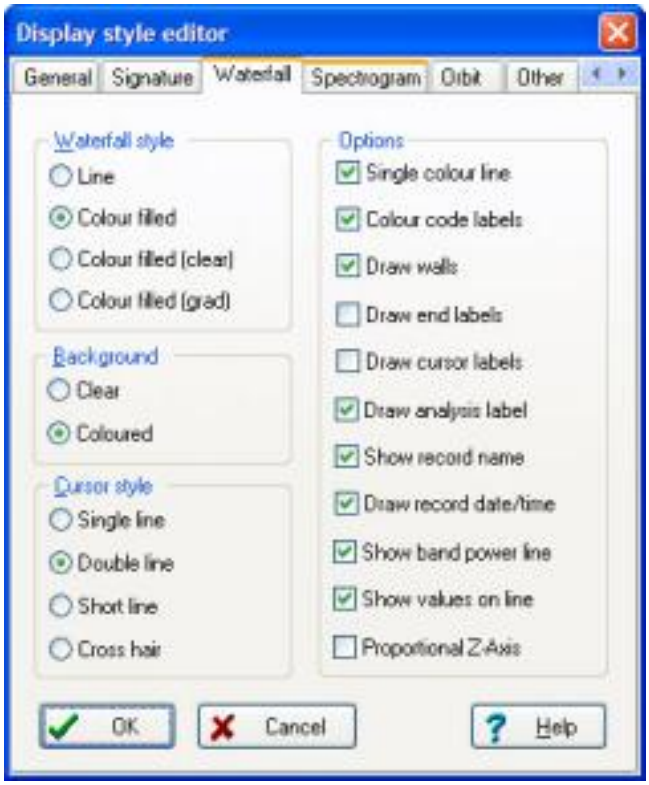

Figure 4 - 13.
Display Style Editor – Waterfall Tab.

Fields include:

Waterfall style area:

Line - No color fill is added below the line.

Color filled - Fills the area below the line with a specific color (spectral fill on the general colors list).

- If you want to distinguish more lines in an overlay plot, in case of more than one spectrum, you have to unselect this option. Select **Line** instead.

Color filled (clear) - Fills the area below the line with the same color as the general graph area.

Color filled (gradient) - Fills the area with the selected spectral fill color, but changes to a gradient, with the darkest at the back and white at the front.

Background area:

Clear - Plots use the same background color as the general graph area.

Colored - Plots use a separate color for the back and left walls and floor.

Cursor style area:

Single line - Cursor line links the cursor point on each spectrum.

Double line - Uses a thicker cursor line.

Short line - Cursor line is a short vertical line standing on each cursor point.

Cross hair - Uses a crosshair cursor on each spectrum.

Options area:

Single color line - When enabled, the waterfall uses the signature line color for all spectral lines. If this item is disabled, the six waterfall line colors defined on the **General** tab are used; colors repeat for maps with more than six spectra.

- Disabling this option is useful if you want to distinguish more lines in an overlay plot by different colors, for example, if evaluating more than one spectrum.

Color code labels - When enabled, the backgrounds for the cursor value and date labels are drawn using the same colors as used to fill their respective spectral areas (set in **Waterfall style** area).

Draw walls - When enabled, the waterfall floor, left wall, and back walls are drawn. If disabled, there are no wall or grid lines, and the waterfall background colors are not used.

Draw end labels - When enabled, the z-axis notation is written to the right of each spectral plot.

Draw cursor labels - When enabled, the cursor value labels display (the cursor position label always displays).

Draw analysis label, **Show record name** and **Draw record date/time** - When enabled, these labels are drawn at the top of the plot. Note that the program checks the available space and only outputs those that fit. If the labels do not display, increase the window's size or reduce the font's size.

Show band power line name - When enabled, a line representing the band power level is drawn on the left wall of a waterfall when using a power cursor

Show values on line - When enabled, the peak-in-band or band power cursor values are drawn alongside the band power line or peak cursor line on the plot.

Proportional Z-Axis - When enabled, spectra is proportionally spaced using the current active z-axis information. If disabled, spectra are evenly spaced.

Display Style Editor – Spectrogram Tab

The **Spectrogram** tab defines the colors used to draw spectrogram plots.

The colors on the spectrogram are defined by two or more color points, between which the color values interpolate. The default set includes five bands ranging from blue (lowest amplitude) to red (highest).

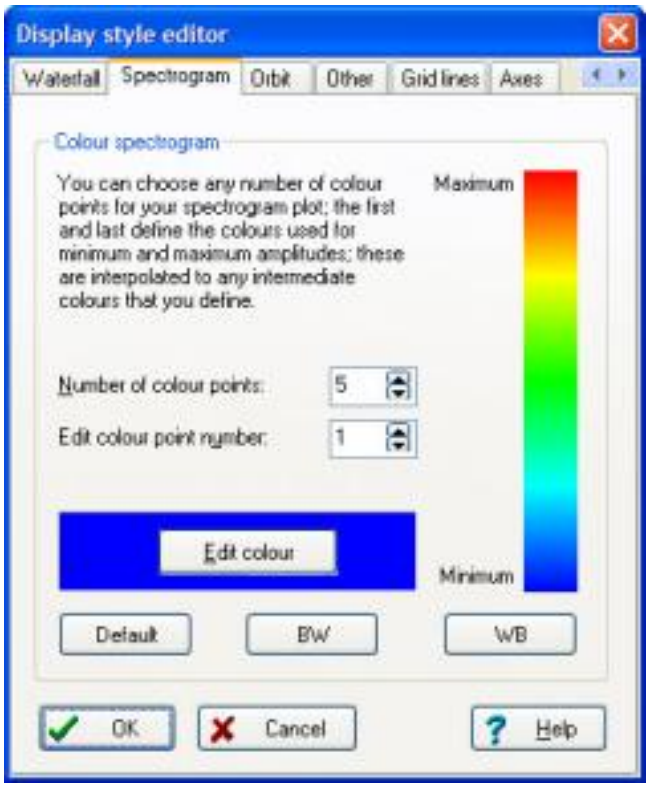

Figure 4 - 14.
Display Style Editor – Spectrogram Tab.

Fields include:

Number of color points - Edit the value to change the number of color bands used. As you do this, the preview bar to the right updates to reflect this.

- New bands default to black.

Edit color point number - Select the color point number to edit and then click the **Edit color** button to select a new color for the color point number.

Three default color sets are also available:

- **Default -** Click to use the default color setting.
- **BW** - Click to use black to white.
- **WB** - Click to use white to black.

Display style editor – Orbit Tab

The **Orbit** tab defines the style used to draw orbit/polar plots.

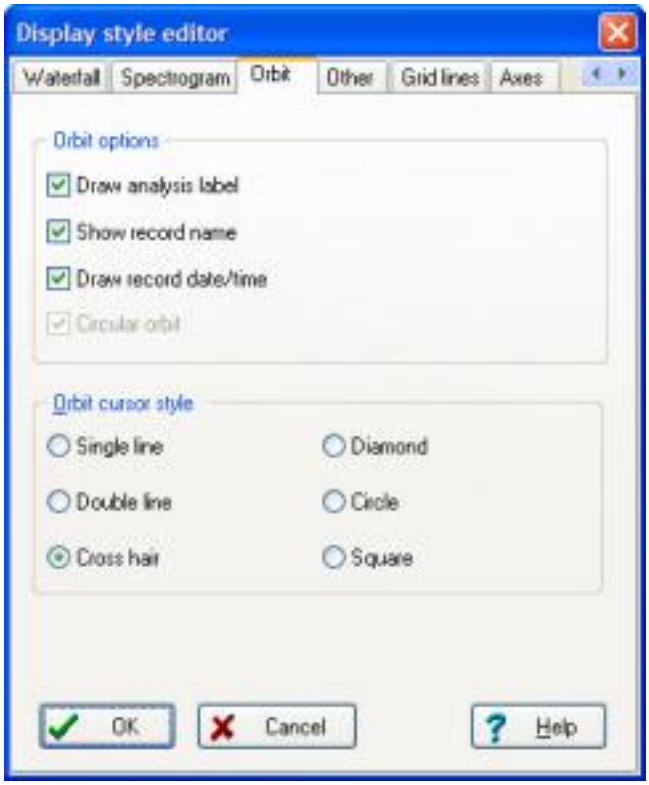

Figure 4 - 15.
Display Style Editor – Orbit Tab.

Fields include:

Orbit options area:

Draw analysis label, **Show record name** and **Draw record date/time** - When enabled, these labels are drawn at the top of the plot; note that the program checks the available space and only outputs those that fit. If the labels do not display, increase the window's size or reduce the font's size.

Circular orbit - When enabled, ARM draws orbit and polar plots in a circular panel. You may also choose to view radial grid lines and probe position markers. Access these options on the **Grid lines** tab.

Orbit cursor style area:

Single line - Cursor line links the cursor point on the trace to the center (origin) of the plot.

Double line - Uses a thicker cursor line.

Cross hair, **Diamond**, **Circle**, and **Square** - Cursor appears as the selected shape.

Display Style Editor – Other Tab

The **Other** tab defines the style used to draw the cursors on overlay, Bode, and Nyquist plots.

Figure 4 - 16.
Display Style Editor – Other Tab.

Fields include:

Overlay cursor style area:

Single line - Cursor line links the cursor point on the trace to the center (origin) of the plot.

Double line - Uses a thicker cursor line.

Short line - Cursor line is a short vertical line standing on each cursor point.

Cross hair - Cursor appears as a crosshair shape.

Bode options area:

Single color line - When enabled, the waterfall uses the signature line color for all spectral lines. If this item is disabled, the six waterfall line colors defined on the **General** tab are used; colors repeat for maps with more than six spectra.

Proportional x-axis - When enabled, spectra is proportionally spaced using the current active y-axis information. If disabled, spectra are evenly spaced. It is recommended to enable the **Proportional x-axis** to achieve a realistic view of the machine characteristics during transient analysis.

Labels inside plot - When enabled, controls where the information panel (showing order, amplitude and phase values) is drawn, within the upper Cartesian plot (top right) or outside the plot (to the right).

Coherence options area:

Coherence level - Enter a value (0 to 1) to set the low cutoff level for validating coherence data. When plotted, any values below this level are drawn in red.

Display Style Editor – Grid Lines Tab

The **Grid lines** tab defines the style used to draw the gridlines on single signature and orbit plots.

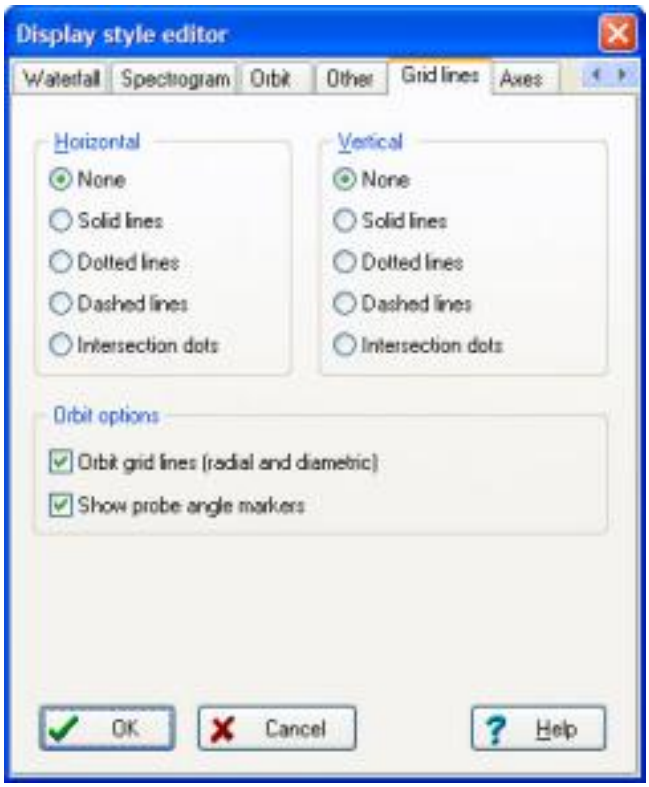

Figure 4 - 17.
Display Style Editor – Grid Lines Tab.

Fields include:

Horizontal and Vertical areas:

None, **Solid lines**, **Dotted lines**, **Dashed lines** and **Intersection dots** – Select a grid line style.

- Intersection dots do not display unless both **Horizontal** and **Vertical** are set to this value.

Orbit options area:

Orbit grid lines - When enabled, angle markers display on the plot.

Show probe angle markers - When enabled, x- and y-axis probe angles are drawn on the orbit.

Display Style Editor – Axes Tab

The **Axes** tab defines how to tick and annotate the axes on all plots.

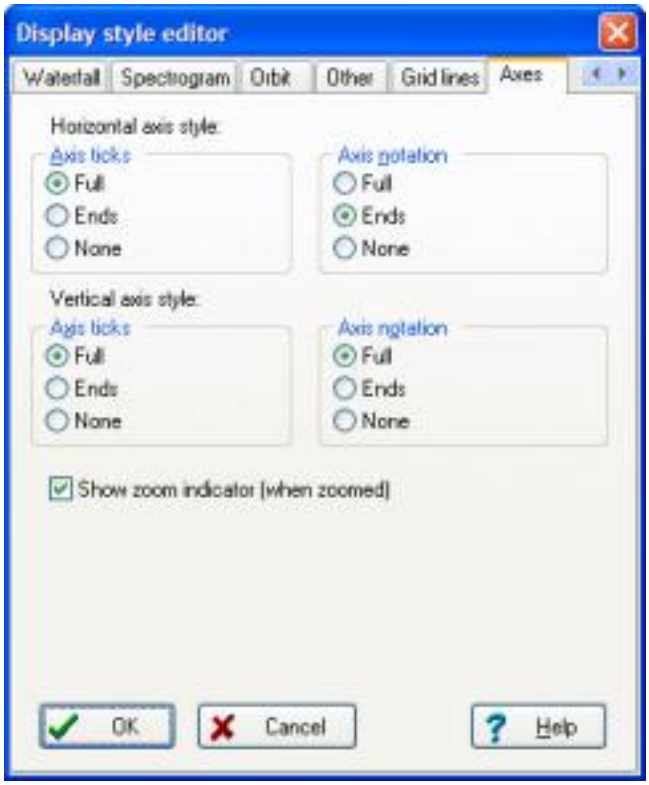

Figure 4 - 18.
Display Style Editor – Axes Tab.

Fields include:

Full, **Ends** or **None** - Specify the **Axis ticks** and **Axis notation** for the horizontal and vertical directions.

Show zoom indicator - When enabled, a small zoom indicator bar displays at the top left of any Cartesian plot when zoomed in. The zoom indicator shows the size and position of the zoom relative to the entire plot.

Zooming

The **Graph** menu's **Zooming** options allow you to change the horizontal scale of the plot. The zoom functions works with all plot types.

You may zoom in and out on a plot in a variety of ways:

- Using the **Graph** menu's **Zooming** options or hot keys
- Dragging a zoom bar on the graph using the mouse
- Entering the zoom values directly

Using the Graph Menu's Zooming Menu Options or Hot Keys

To zoom in:

- Click **Zoom in** from the **Graph / Zooming** menu or press **Z**. When you zoom in, the span of the current plot displayed is halved. If a cursor is active, the zoom centers on the cursor point, otherwise it centers on the lower half of the current zoom.

To zoom out:

- Click the **Zoom out** option from the **Graph / Zooming** menu or press **Alt+Z**. The same rules regarding centering apply as for zooming in.

To reset the zoom back to its original, full display:

- Click the **Reset zoom** option from the **Graph / Zooming** menu, or press **Ctrl+Z**.

Dragging a Zoom Bar on the Graph Using the Mouse

To zoom in using the mouse:

- Click just below the x-axis and drag the mouse along to the other position. As you move the mouse, a red zoom bar displays the extent of the new zoom.

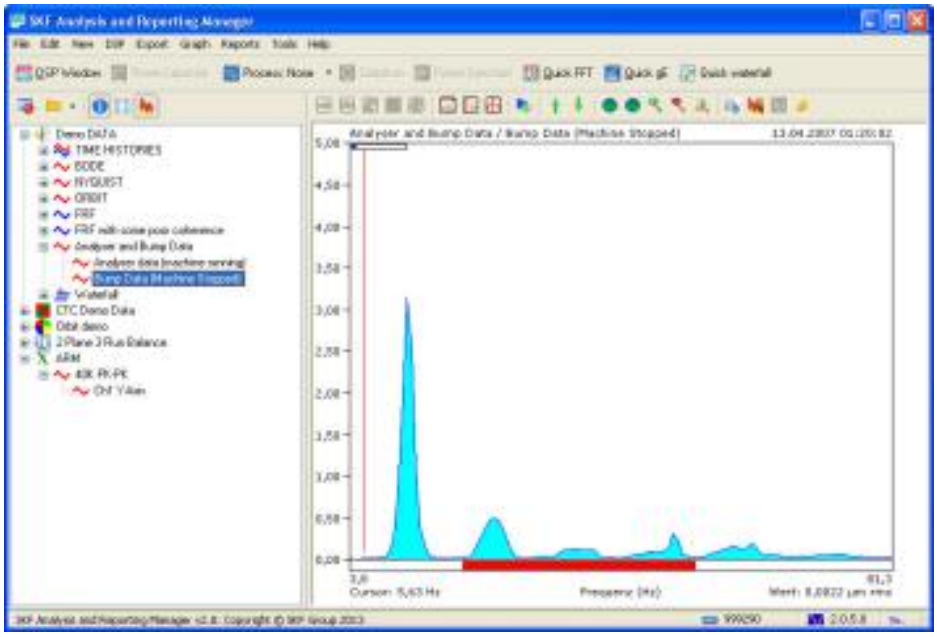

Figure 4 - 19.
Zooming in.

- Release the mouse on or above the x-axis. The plot redraws using the specified zoom (the zoom range shows in the status panel as you drag the mouse).

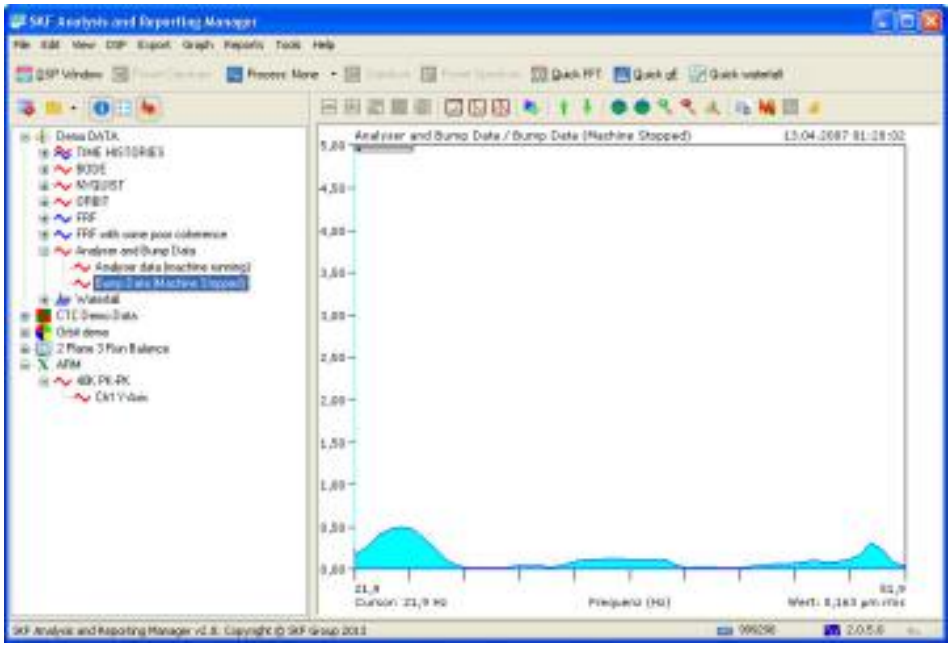

Figure 4 - 20.
Zooming Result.

➢ If you release the mouse below the level of the x-axis ticks, the zoom is cancelled.

To reset the zoom using the mouse:

- Double-click in the area immediately below the x-axis.

Entering the Zoom Values Directly

To type in a required zoom:

- Click the **Specify zoom** option from the **Graph / Zooming** menu. The **Set horizontal range** dialog displays, allowing you to enter the start and end zoom positions.

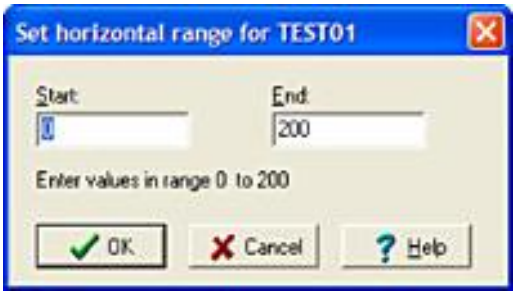

Figure 4 - 21.
Set Horizontal Range Dialog.

Zoom Indicator

An optional zoom indicator displays in the top left corner of each plot and shows the extent of the current zoom.

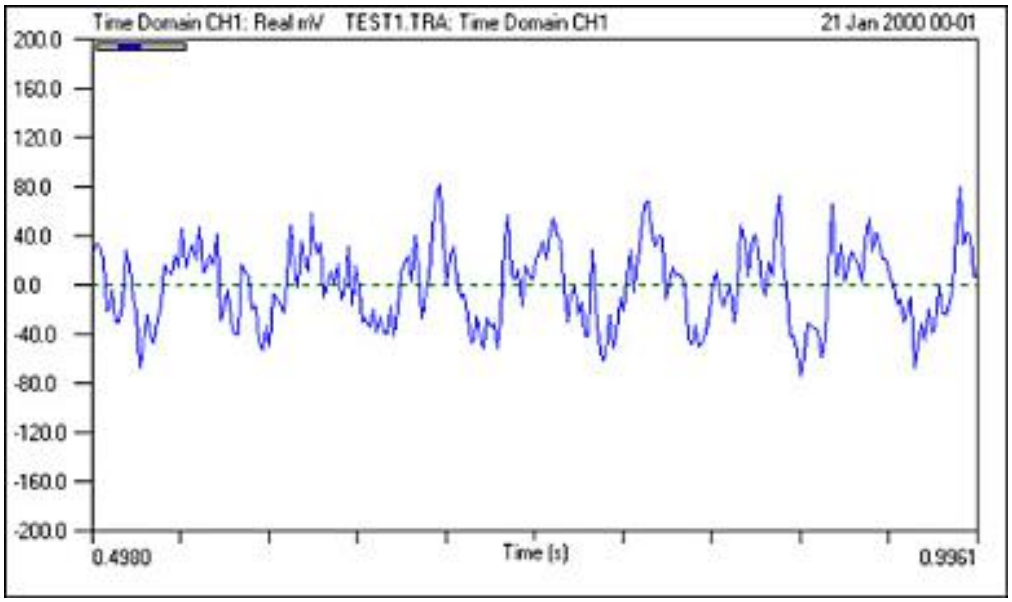

Figure 4 - 22.
Zoom Indicator.

- Enable the zoom indicator in the Display Style Editor's **Axes** tab.

Panning

- When zoomed in on a plot, you may pan the zoom to the left and right using the **Graph / Zooming** menu's **Pan left** or **Pan right** options, or by pressing **Ctrl-L** or **Ctrl-R**.
- To reset to the full display, double-click the zoom indicator.

Scaling

The **Graph** menu's **Scaling** options allow you to changing the vertical scale of the plot. All plot types may be scaled.

To magnify the plot:

- Click **Magnify**, or press the **M** key or the up arrow on the keyboard.
    - ➢ Note that all vertical scales move along a 2-5-10 scaling step.

To reduce the vertical scale:

- Click **Reduce**, or press **Alt+M** or the down arrow on the keyboard.

To reset the scale back to its original range:

- Click **Reset scale**, or press **Ctrl+M** on the keyboard

Or

- Double-click the area immediately to the left of the y-axis.

Plot Types

Cartesian Plots

On a Cartesian plot, data is plotted in two perpendicular directed lines (x- and y-axis). For time-domain data, the x-axis defines the time interval of the original sampling. For frequency domain data, the x-axis defines the frequency step of the resulting spectrum.

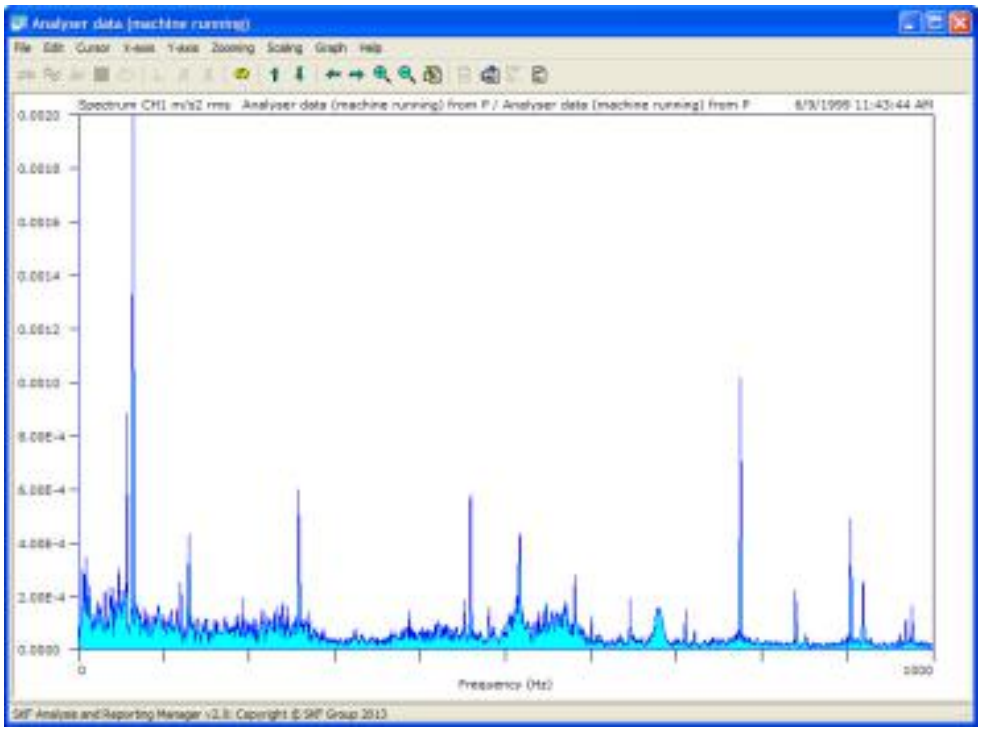

Figure 4 - 23.
Cartesian Plot.

The y-axis displays data in linear or logarithmic scales and, if the source data is complex, in the real and imaginary scales.

Use the **Display Style editor** to customize the appearance of Cartesian plots.

Waterfall Plots

ARM displays multiple channel data as waterfall or overlay plots.

A waterfall plot consists of several frequency-domain signature readings drawn in a cascading waterfall layout, displaying the data change from reading to reading.

An overlay plot is a waterfall plot with no offset on the z-axis.

To change the layout or aspect ratio of the waterfall:

- Click the plot's intersection of the three axes.
- Drag this point around to achieve your desired display.

ARM can display any group of frequency domain spectral data in a waterfall plot. You can also create custom waterfall plots from a mix of any records of the same analysis type.

When you click a record containing multiple spectral readings, a waterfall automatically displays.

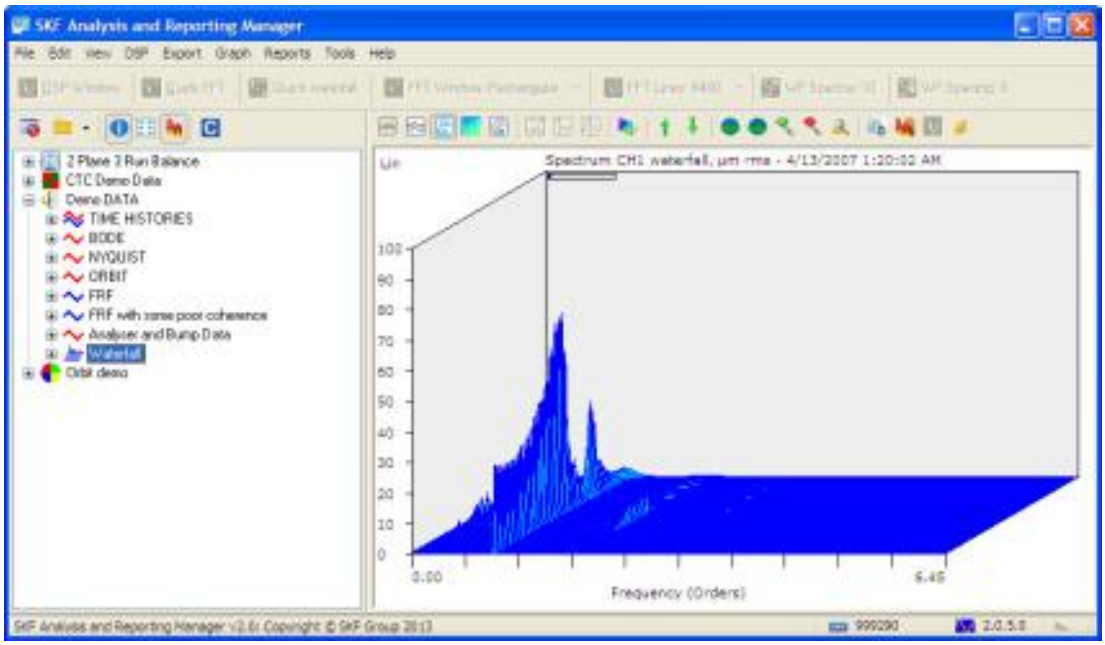

Figure 4 - 24.
Waterfall Plot.

- Use the options on the **Change plot type** menu to toggle between the waterfall and other display types, such as overlay and multiple plots.

Waterfall plots may be shown with their z-axis spaced evenly or proportional to any z-axis information contained in the data (e.g., speed values from a run up).

To switch between proportional and even spacing:

- Click the **Graph** menu's **Display styles / Edit display style** option and enable the **Proportional Z-Axis** checkbox on the **Waterfall** tab.

Zoom and scale functions work the same as they do for single or dual signature plots.

To change the layout using the mouse:

- Place the mouse cursor over the intersection point of the three axes.
- The cursor changes to a NS-EW shape to indicate that you can drag the intersection point.

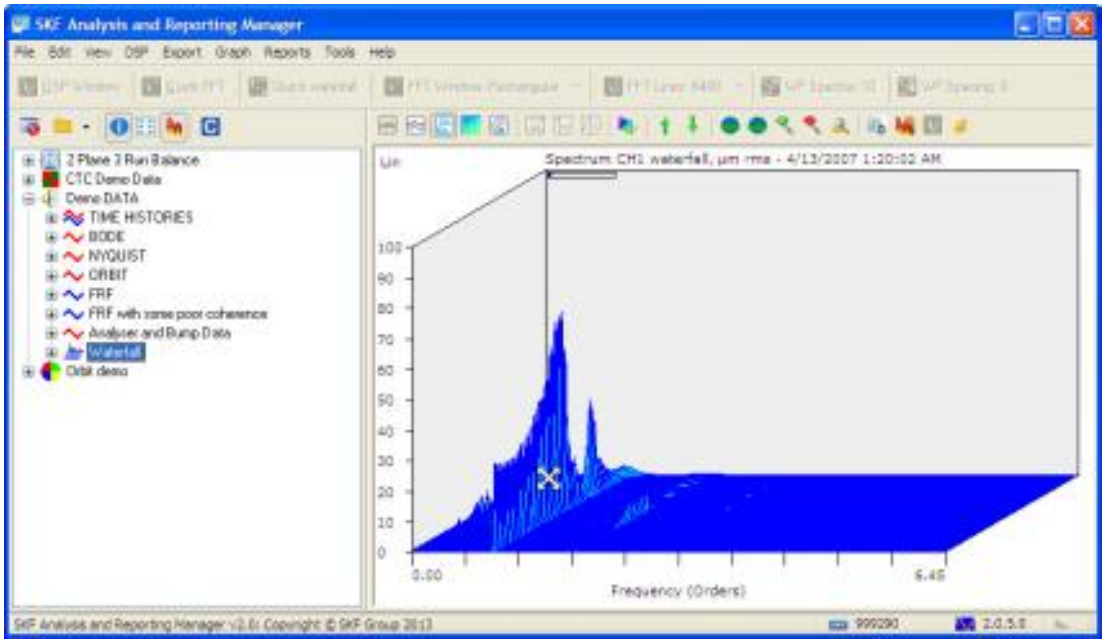

Figure 4 - 25.
Waterfall Plot Moving Mouse.

- As you move the mouse, the new layout previews as a set of dotted lines.

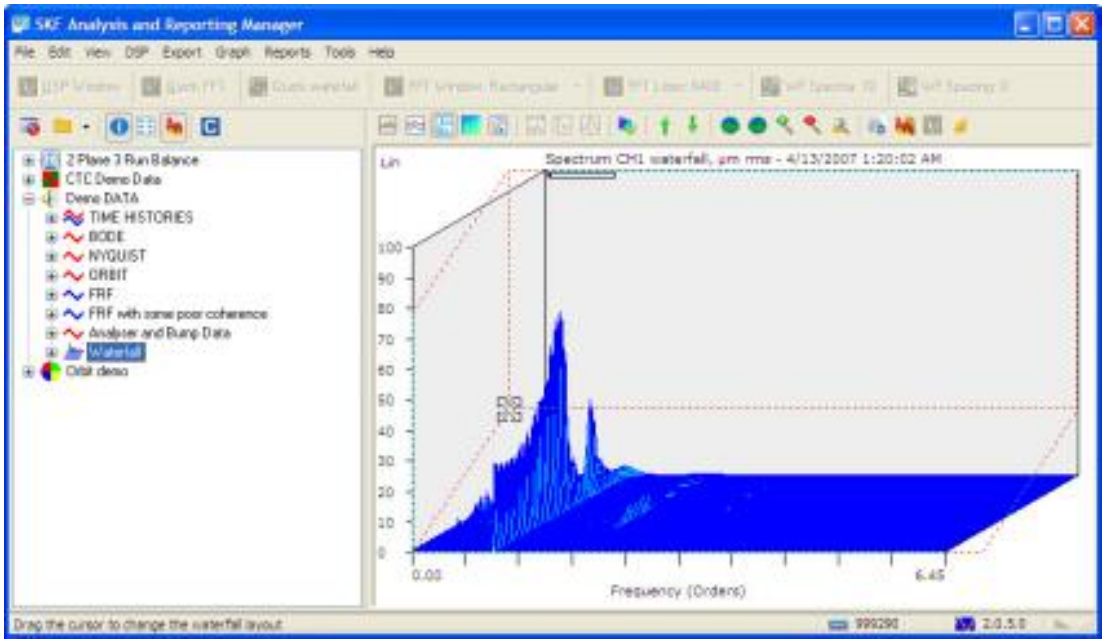

Figure 4 - 26.
Waterfall Plot Moving Mouse.

- When you release the mouse, the waterfall is drawn in the new position.

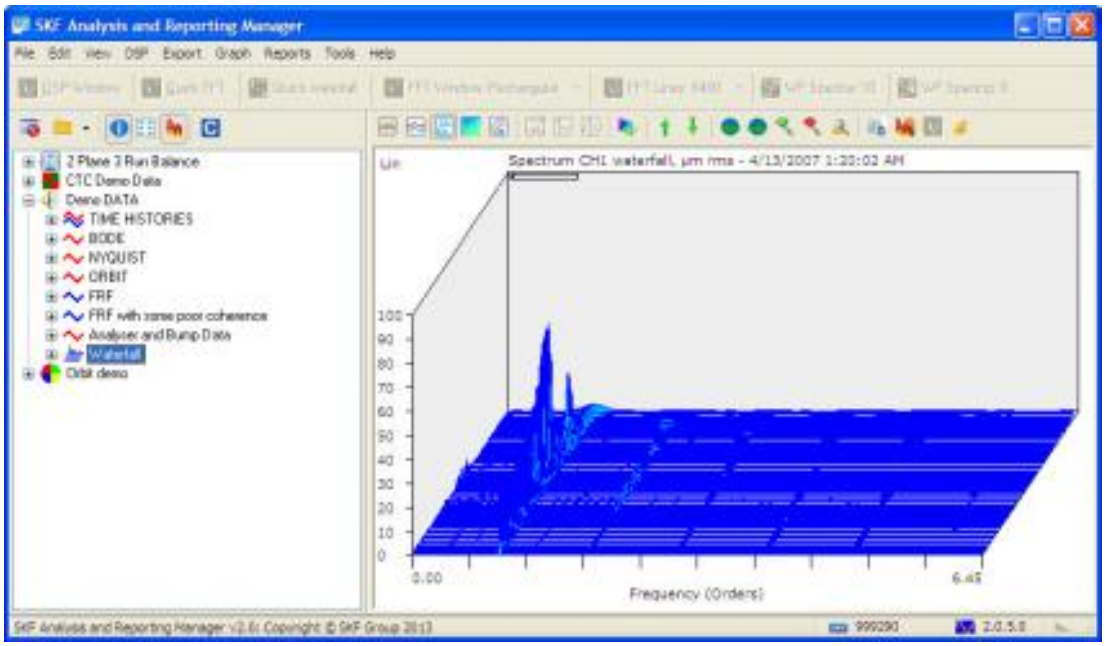

Figure 4 - 27.
Waterfall Plot Moving Mouse.

Mouse control is similar in waterfall plots to single signature plots. Use the **left**, **right**, **Home** and **End** keys, and you can click on the graph. In this last case, the application looks for the signature line nearest the click point (up to 10 pixels away) in order to identify the line that was clicked on. This makes it very easy to click on a prominent peak.

Waterfalls are drawn with the earliest record at the front and the latest at the back.

To reverse the waterfall layout:

- Click **Graph / Reverse waterfall**. This option remains enabled while in use.
- To cancel it, click **Graph / Reverse waterfall** again.
    - ➢ This setting is specific to the currently displayed data set and remains with any particular waterfall once made.

To specify which records to included in the waterfall display:

- Click **Multiple plot / waterfall ranges** from the **Graph** menu. The **Choose records to include in display** window appears with a listing of each individual record.

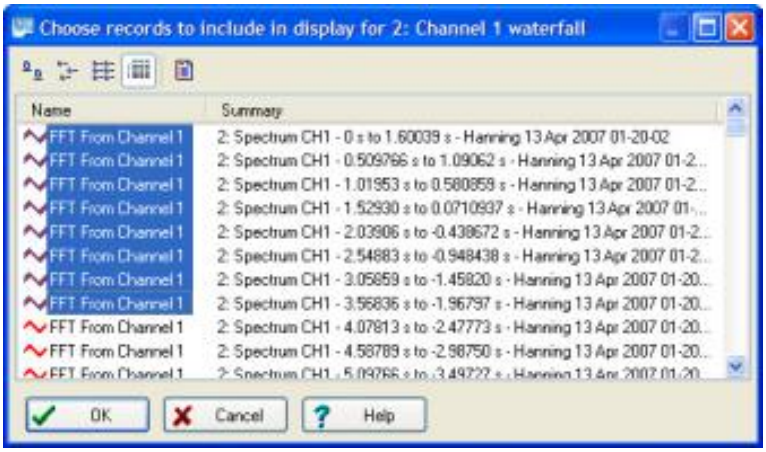

Figure 4 - 28.
Choose Records to Include in Display Window.

- Use standard Windows commands to select the records required or right-click to display a menu with **Select all** and **Clear all** options. Note that this option does not remove any records from the underlying data structure, it only omits them from the waterfall display.

The **Graph** menu's **Waterfall / Change Z-Axis information** option is available when the record contains multiple z-axis information. The selected data is used for the labeling at the end of each spectrum and the optional proportional spacing of the waterfall.

To change the z-axis information:

- Click the **Graph** menu's **Waterfall** / **Change Z-Axis information** option. The **Please choose a Z-Axis annotation** window displays.
- Select the annotation type to use on the waterfall display and click **OK**.

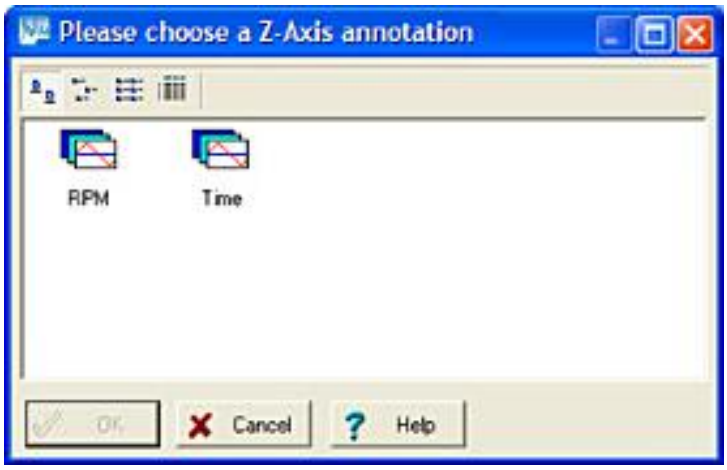

Figure 4 - 29.
Please Choose a Z-Axis Annotation Window.

- If you are using proportional z-axis spacing in your waterfall plot, changing this changes the appearance of the plot.

To change your waterfall plot proportional z-axis spacing option:

- Click **Graph / Display styles / Edit display style**. The **Display style editor** window displays.
- On the **Waterfall tab**, enable the **Proportional Z-Axis** option.

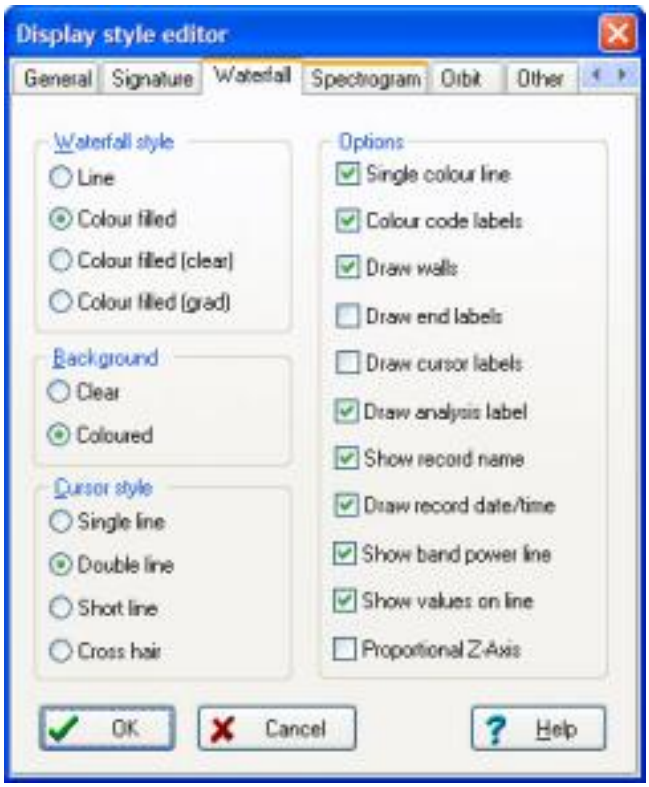

Figure 4 - 30.
Display Style Editor – Waterfall tab.

Waterfall Blanking

Waterfall blanking refers to configuring waterfall plots to hide data values below a specified percentage of the waterfall peak value.

To set the waterfall blanking:

- Enter any positive number between 0 and 100.

Figure 4 - 31.
Waterfall Blanking.

- Click **OK**. The plot is redrawn.

Create Waterfall Dialog

Use the **Create waterfall** dialog to combine a group of files into a single waterfall plot. Specify how to find the files and sort the records before combining into a waterfall plot. You can select any file types supported by ARM; all records extract and then sort accordingly.

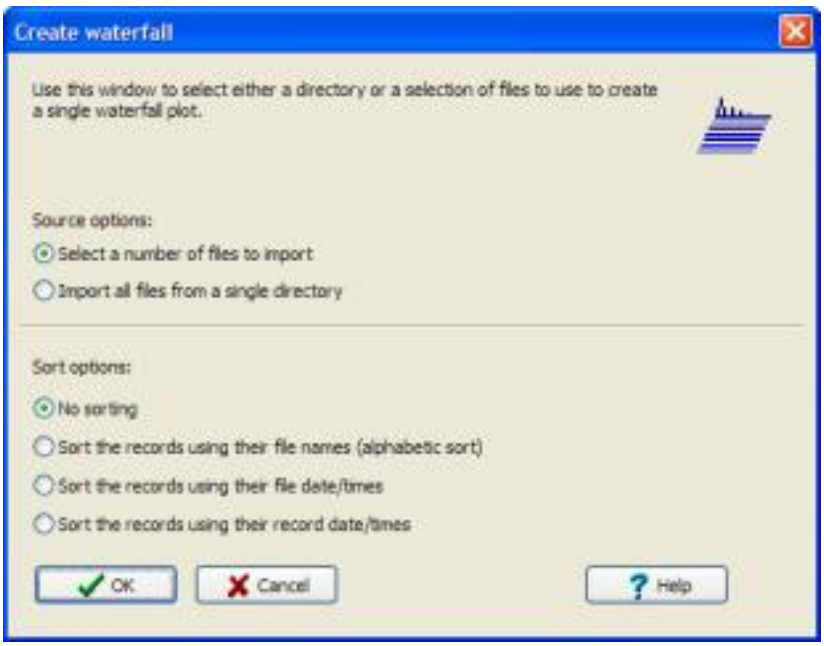

Figure 4 - 32.
Create Waterfall Dialog.

- Specify options for finding files in the **Source options** group.

Select a number of files to import - Select the files manually.

Import all files from a single directory - Select a directory. All files from the directory load.

- Specify options for importing records in the **Sort options** group.

No sorting - Inserts the records into the waterfall in the order they were found.

Sort the records using their file names (alphabetic sort) - Sorts the records alphabetically based on their file names.

Sort the records using their file date/times - Sorts the records by individual source file's date.

Sort the records using their record date/times - Sorts the records by the data's date.

Orbit/Polar Plots

ARM displays dual-channel data as orbit or polar plots.

Orbit plots display synchronous time domain waveforms, normally taken from two probes arranged radially at 90 degrees to one another, in order to show the rotational behavior of the machine being monitored.

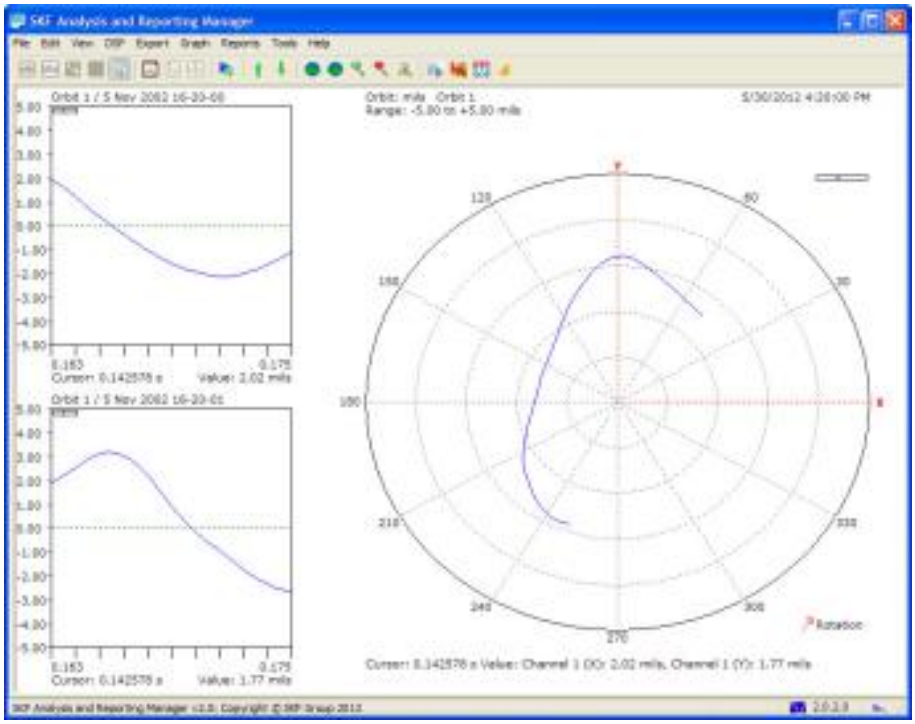

Figure 4 - 33.
Orbit/Polar Plot.

Polar plots are circular plots used to show frequency domain data containing phase information. Data is plotted using the amplitude and phase information in the data.

Configure orbit and polar plots to show only a portion (between cursors) of the record for focusing in on a single cycle of the orbit or a frequency/phase region of interest.

When ARM displays orbit or polar data, you may choose to show the orbit/polar plot alone, or with two Cartesian plots of individual channel data. Set up the Cartesian plots to display either the entire record or the portion chosen for display in the orbit/polar plot.

To switch to a polar plot:

- Choose **Orbit/polar plot** from the **Change plot type** menu.

Similarly, with two time domain signatures you can switch to an orbit plot by choosing the same command.

When an orbit or polar plot is shown, a further submenu becomes active, which lets you switch between showing only the orbit/polar plot or having the Cartesian plots alongside (showing either the zoomed portion used for the orbit/polar plot or the full signature length).

When you have the Cartesian plots alongside the orbit or polar plot, you can move the “special zoom lines” (the lines drawn on the Cartesian plot that show the range of the signature used to draw the orbit) in order to zoom in on the relevant part of the orbit.

To set up orbit/polar plot options:

- Select the **Graph** menu's **Orbit/polar options** option.
- Zoom lines.

Use a pair of zoom lines drawn on the Cartesian plots to determine the portion used to plot the orbit/polar plot.

To move these zoom lines:

- Press **Ctrl** and click/drag the lines.
- Position the pointer over one of the lines to move a single line; position the pointer between the lines to move both lines.

To move the lines using the keyboard:

- Press and hold **Ctrl** and use the left and right arrow buttons to move both zoom lines, and **Insert** or **Delete** to increase or reduce the extent.

When displaying only the portion of the record used for the orbit/polar plot, the normal zoom commands for the Cartesian plots control the amount of data displayed in the orbit/polar plot.

Use the **Display Style editor** to customize the appearance of orbit/polar plots.

To change the channel 1 (x) probe angle for orbit plots:

- Select the **Graph** menu's **Orbit options / Probe angle option**. The probe angle is defined in degrees and is measured counterclockwise, with zero degrees at 3 o'clock.

Balance Table and Polar Plots

You can display data loaded from the Balance Module in two forms:

- A table replicating the view you have on the Microlog.
- A polar plot showing the amplitude and phase measured at each stage of the balance run.

These views are different from other plots in that they generate from the "root" level of the balance data structure.

- When selecting the balance data’s "root" node, select the **View** menu's **Graph** option to display either the table or polar plot.
- After the initial display, you can toggle between the two views by selecting the **View** menu’s **Graph** / **Balance table** or **Graph** / **Balance polar plot**.

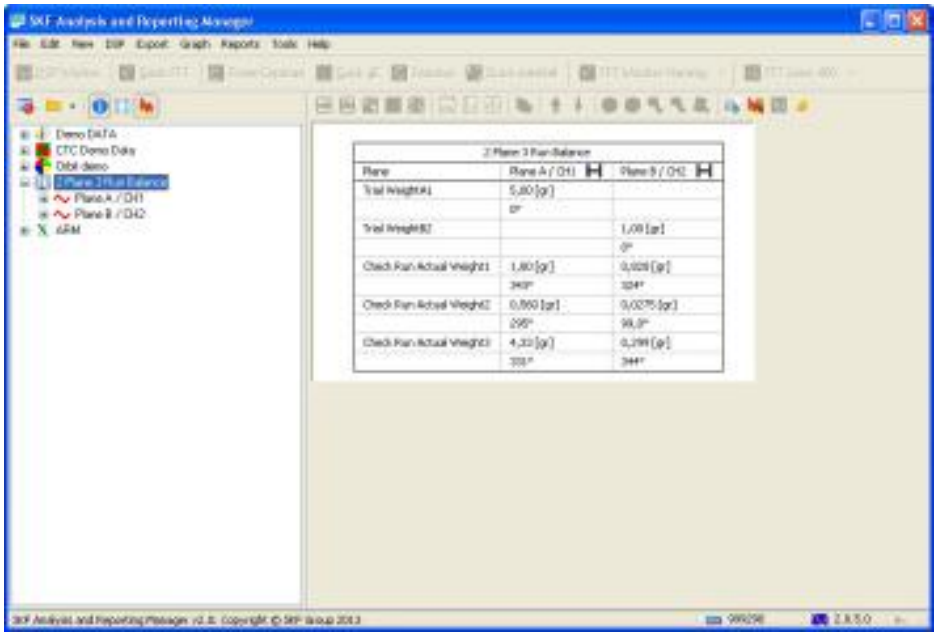

Figure 4 - 34.
Balance Table.

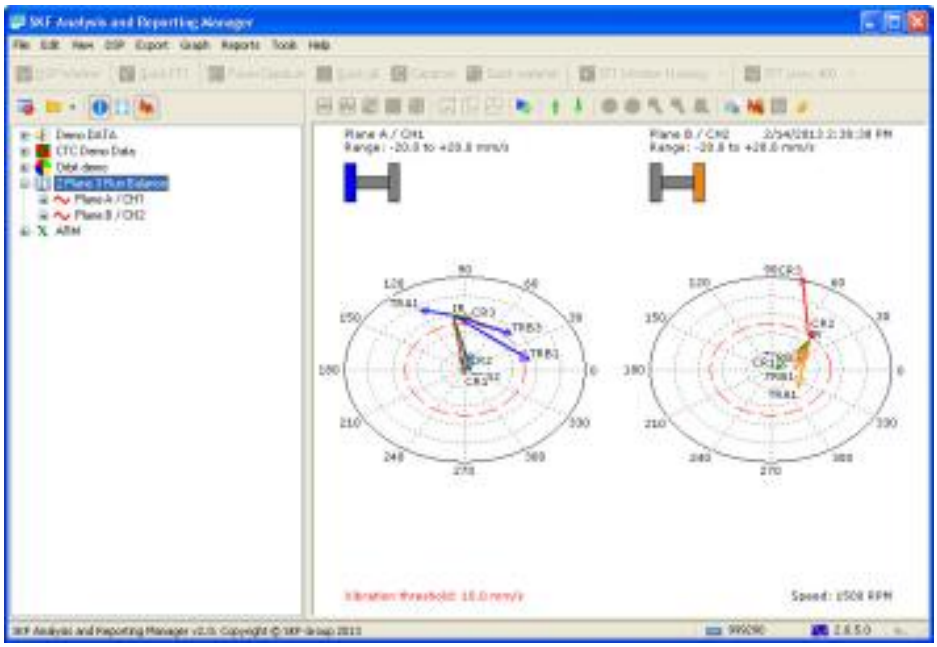

Figure 4 - 35.
Balance Polar Plot.

Bode and Nyquist Plots

Use Bode and Nyquist plots to display Run up / Coast down data.

Bode and Nyquist plots contain one or more amplitude/phase pairs of values plotted against the measured running speed of the machine. Each amplitude/phase pair represents an order from the data. The Run up / Coast down module also captures the overall level of vibration; no phase data is recorded.

The Bode plot shows two Cartesian plots; the upper plot displays the amplitude values and the lower plot displays the phase values. View orders individually or overlay all or selected orders on the plot.

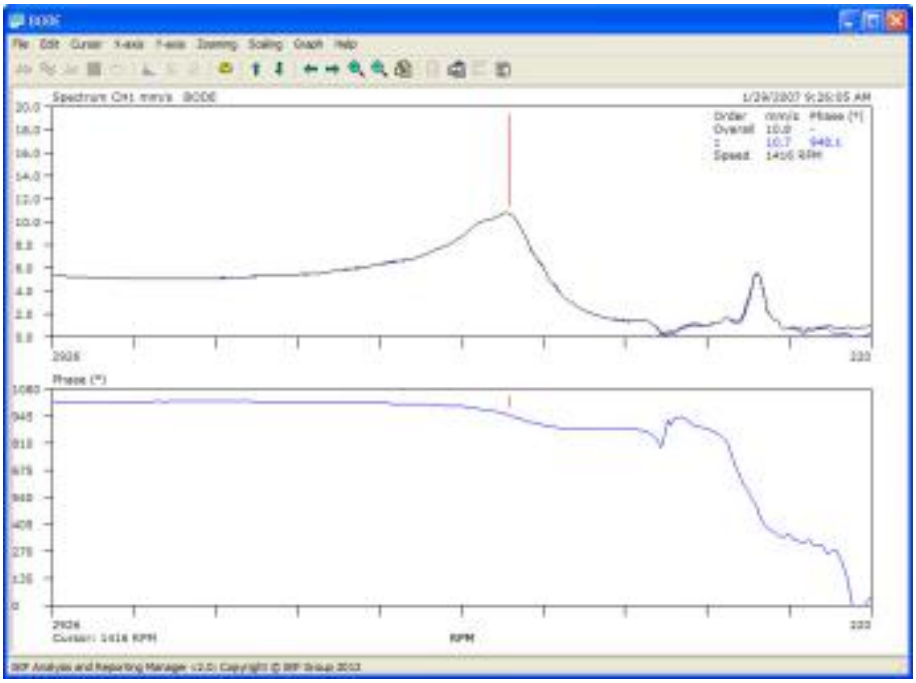

Figure 4 - 36.
Bode Plot.

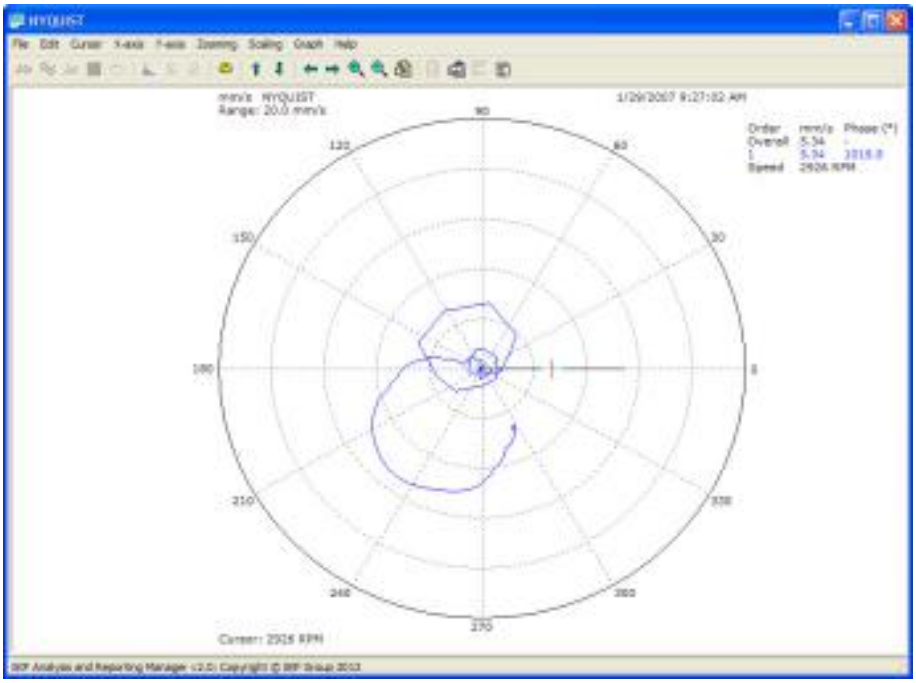

Figure 4 - 37.
Nyquist Plot.

To view selected orders on a Bode or Nyquist plot:

- Select the **Graph** menu's **Multiple plot/Map ranges** option and specify the required orders.

To clarify the phase behavior of the machine:

- Unwrap phase values by identifying phase changes greater than 180 degrees.
- Toggle this option on/off from the **Graph** menu's **Y-Axis / Scale / Unwrap phase** option.

Use the **Display Style editor** to customize the appearance of Bode and Nyquist plots.

As you move the mouse, the new layout previews as a set of dotted lines.

Transfer Function Plots

You can display Transfer Function data by selecting the relevant CSV files when uploading from the Microlog.

Transfer Function plots contain three graphs: amplitude and phase plots of the Transfer Function, and coherence.

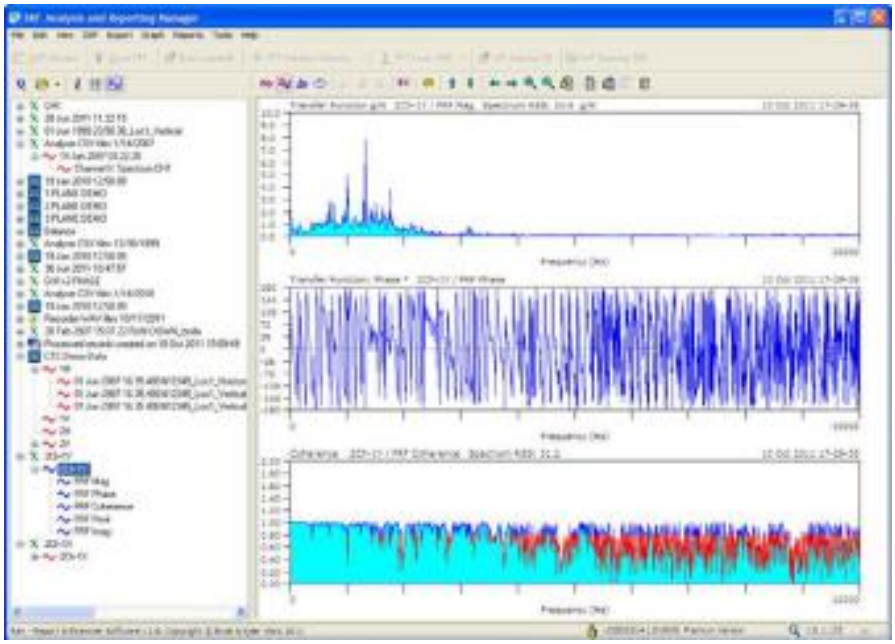

Figure 4 - 38.
Transfer Function Plots.

The coherence plot displays any value below 0.8 in red to aid validation. This level is stored as part of the current display style set up and you may edit it in the **Display Style Editor**.

The default display for a Transfer Function data set is the three stacked plots as shown in the example above; you may display the data on a polar plot by selecting **Graph / Change plot type** / **Orbit/polar plot**. A polar plot hides the coherence plot and uses magnitude and phase plots to construct a polar plot.

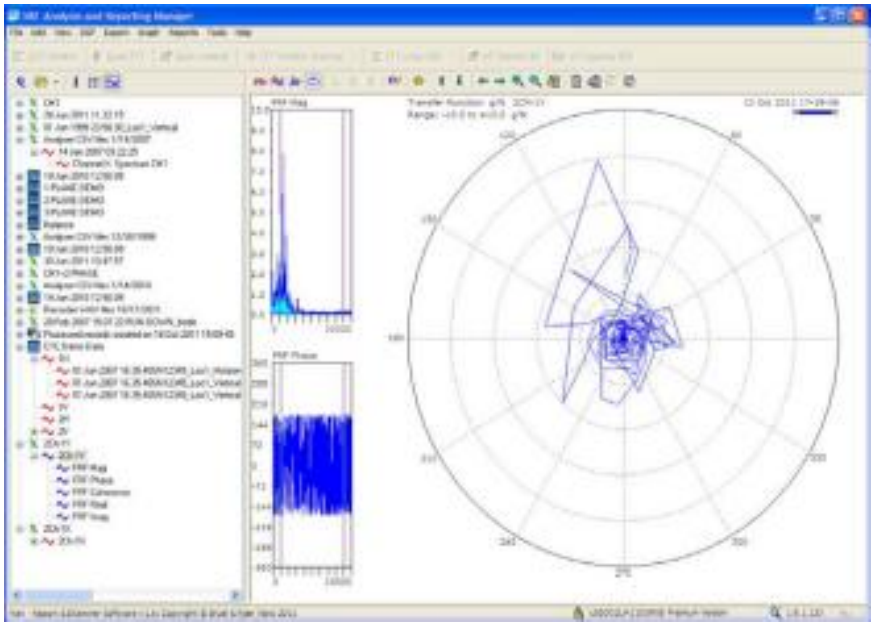

Figure 4 - 39.
Polar Plot.

To return to the original display:

- Select **Graph / Change plot type / Multiple plot**. The amplitude and phase plots display.
- Select **Graph / Multiple plot / Waterfall ranges** to restore the coherence record.

Overlay Plots

Overlay plots are very similar to waterfalls, except they do not have an axis offset.

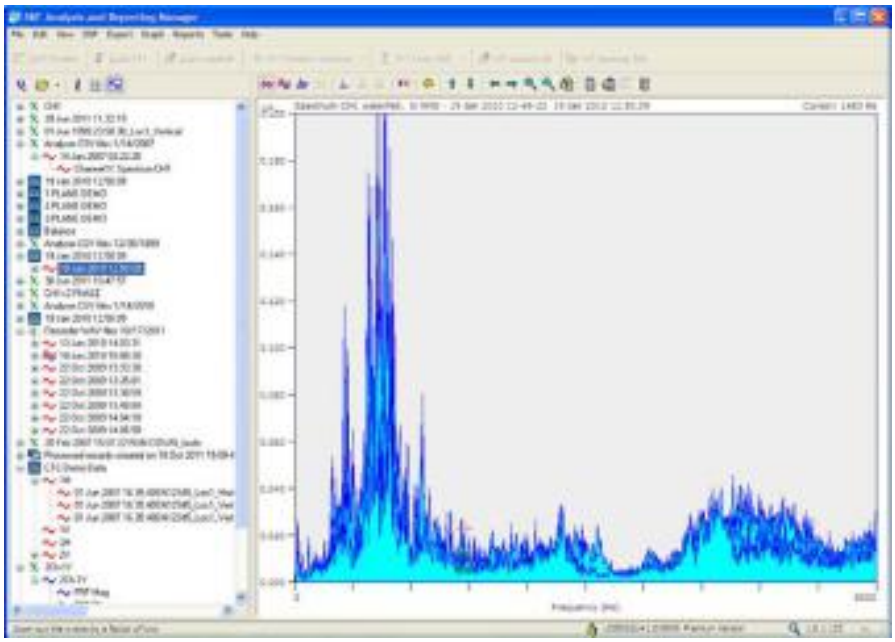

Figure 4 - 40.
Overlay Plot.

Unlike waterfall plots, overlay plots can display time-series data in overlays.

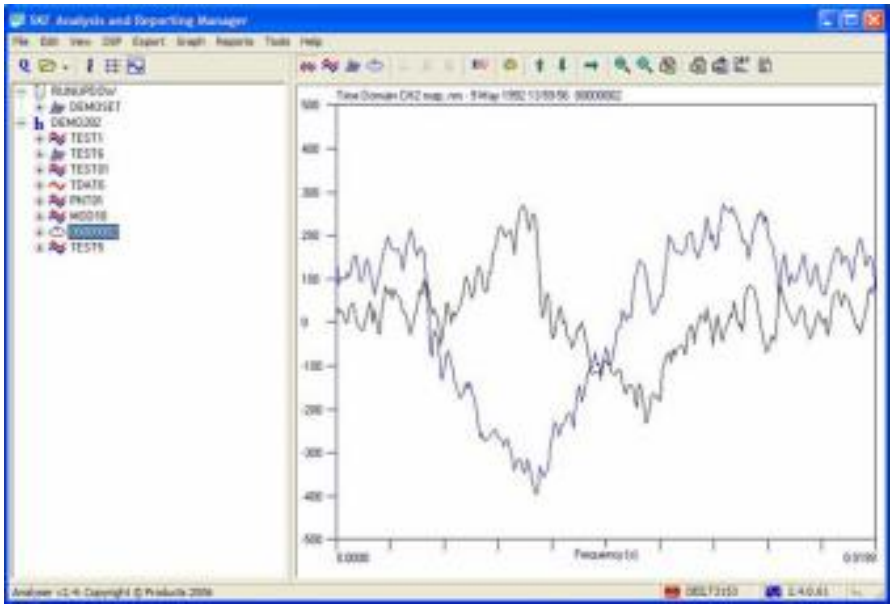

Figure 4 - 41.
Time-Series.

Multiple Plots

Multiple plots function similarly to single or dual signature plots, but can contain any number of records, each displayed in a separate plot.

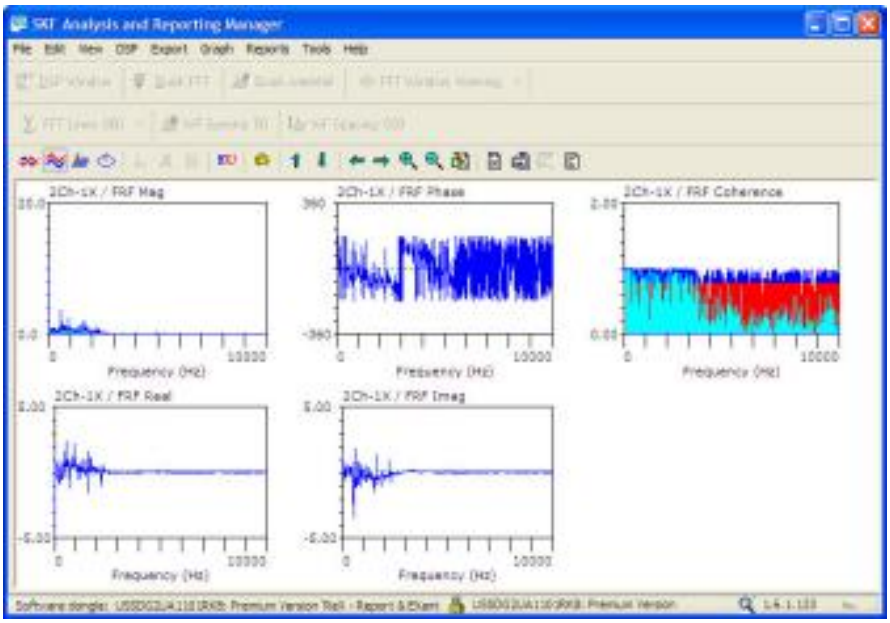

Figure 4 - 42.
Multiple Plots Function.

As with dual signature plots, you may control each plot separately, or you may control all plots with similar traces by enabling the **Control all** option on the **Graph** menu.

Cursors

Cursor Overview

Several dynamic cursors are available: single, harmonic, side-band, difference, and power. All cursor position and status information is recorded in the data structure and preserved when saved.

To initiate a cursor on any plot:

- Press the right and left arrow keys on the keyboard to move it across the plot, or click the mouse on the position. You may also drag the cursor with the mouse.
- Press **Ctrl-Left** on the keyboard to jump to the next peak to the left, and **Ctrl-Right** to jump right. Peaks are selected by finding a point that is more than 25% of the signature peak value and that has two lower lines to the left and two lower lines to the right.

To move the cursor to the peak value:

- Select the **Cursor** menu's **Cursor to peak** option, or press **Alt+P**. On spectrum or waveform plots the cursor moves to the peak value in the currently displayed range. On waterfall plots, this initiates a peak tracking cursor, suitable for plotting a spectral slice through the waterfall.
- Move the mouse over the current cursor position on the spectrum in question, and **Ctrl+drag** the cursor line to its new position.

To remove the cursor from a plot:

- Select the **Cursor** menu's **Cursor off** option.

Output cursor values to a summary window using the **Output cursor values** command, and produce a waterfall spectral slice based on the current cursor positions using the **Cursor** menu's **Waterfall spectral slice** option.

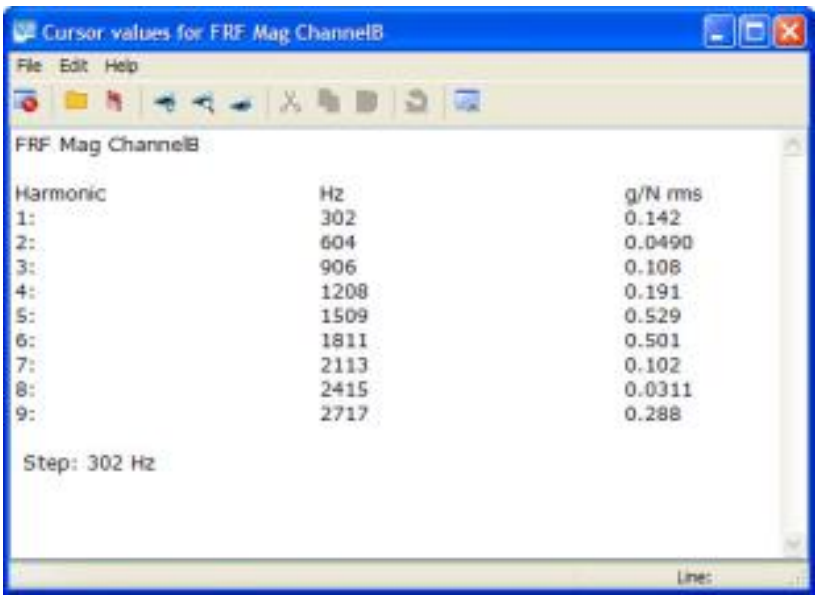

Figure 4 - 43.
Output Cursor Values.

Harmonic Cursor

A harmonic cursor comprises the reference position and a number of harmonics of this location.

To display a harmonic cursor:

- Select the **Cursor** menu's **Harmonic cursor** option or press **Ctrl+H**. The harmonic numbers, frequencies, and amplitude values list to the right of the plot.
- Select the **Cursor** menu's **Output cursor values** option to output these to a summary window.

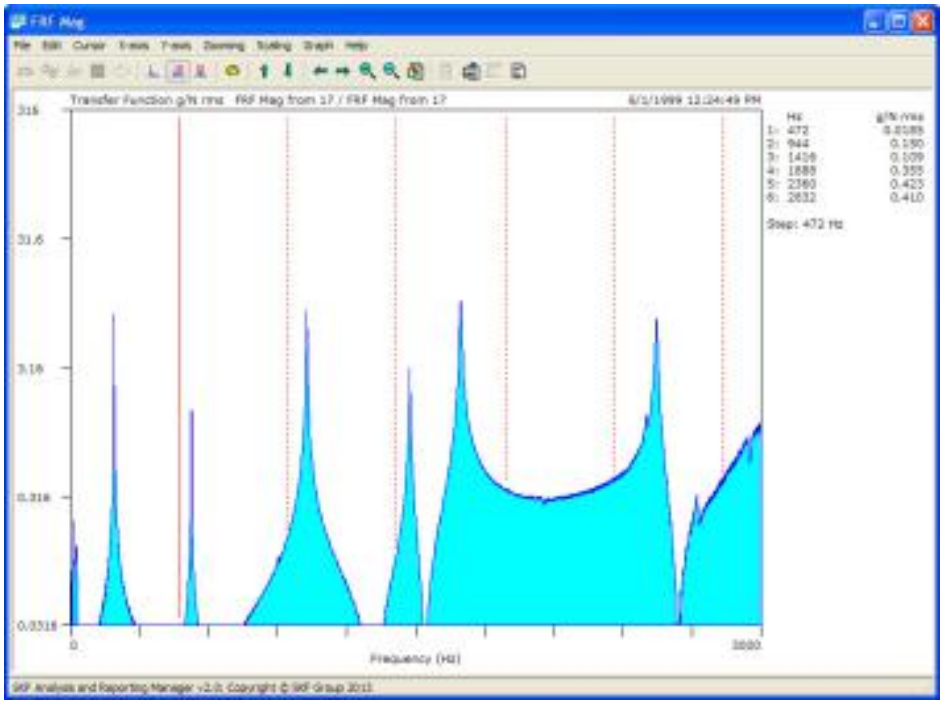

Figure 4 - 44.
Harmonic Cursor.

To add or subtract harmonics:

- Select the **Cursor** menu's **Add harmonic** and **Remove harmonic** options, or press **Insert** or **Delete** on the keyboard.

To move the harmonics in small steps:

- Press the right and left arrow keys. The highest harmonic moves one spectral line at a time, and the remainder move in proportional increments.

To jump the harmonic lines to their nearest peaks:

- Select the **Cursor** menu's **Cursor to peak** option, or press **Alt+P**.

To remove the harmonic cursor:

- Press **Ctrl+H** again or select another cursor from the **Cursor** menu.

Side-band Cursor

Side-band markers consist of pairs of markers evenly spaced on both sides of a side-band cursor reference position. Side-band markers are referenced as located from left to right around the center cursor. Side-band markers to the left of the center cursor are referenced with negative numbers; their associated markers to the right of the cursor are referenced with positive numbers.

To display a side-band cursor:

- Select the **Cursor** menu's **Side-band cursor** option or press **Ctrl+B.**

Initially, the side-band cursor displays one pair of markers at a single spectral step from the center cursor. Use the left and right arrow keys to decrease or increase the frequency step.

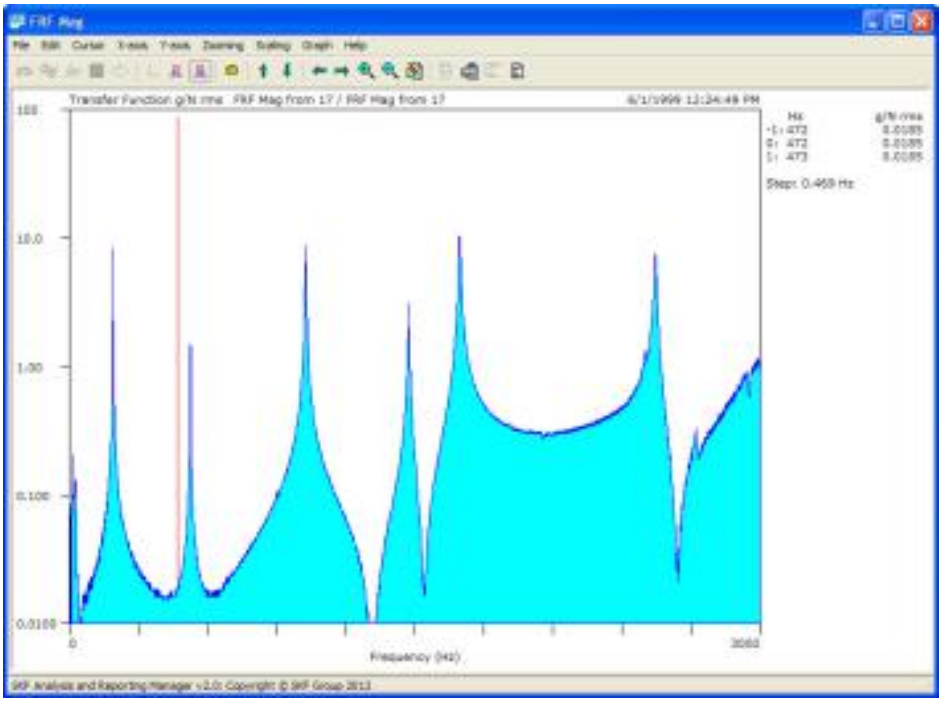

Figure 4 - 45.
Side-band Cursor.

To remove the side-band cursor:

- Press **Ctrl+B** again or select another cursor from the **Cursor** menu.

Threshold Cursor

A threshold cursor displays all lines in the signature or spectrum greater than or equal to a specified value.

To display a threshold cursor:

- Select the **Cursor** menu's **Threshold cursor** option or press **Ctrl+E**. A threshold cursor level dialog displays.

Figure 4 - 46.
Threshold Cursor Level Dialog.

- Enter the threshold cursor level and click **OK**.

Once you enter the level, ARM redraws the plot with a cursor line at every signature line or spectral bin with a value at or above the specified level. A listing of all of these lines, showing the level and the frequency, displays to the right of the plot.

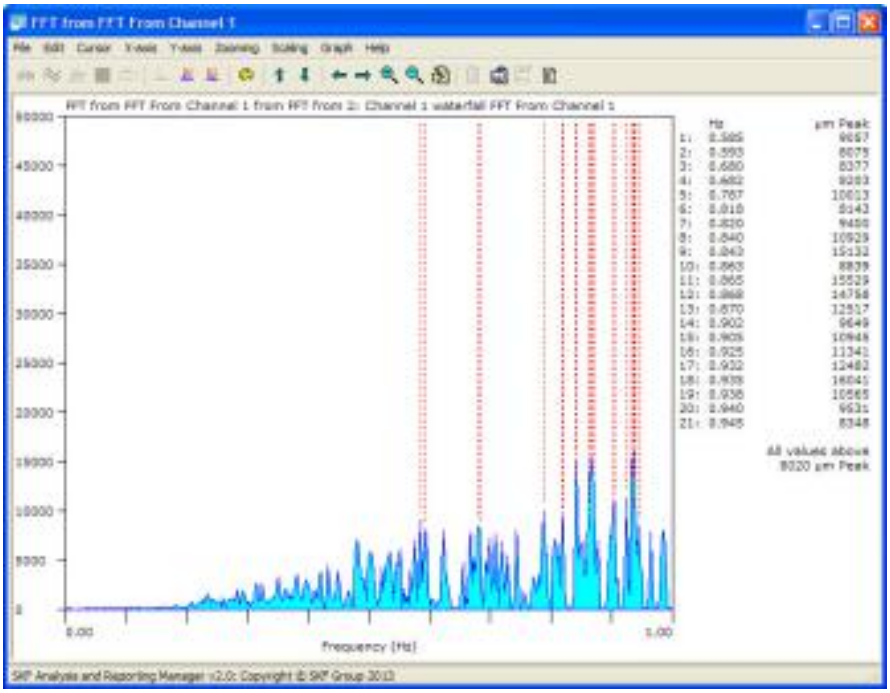

Figure 4 - 47.
Threshold Cursor Level.

To change the threshold cursor level:

- Select the **Cursor** menu's **Threshold cursor level** option.

To remove the threshold cursor:

- Press **Ctrl+E** again or select another cursor from the **Cursor** menu.

Order Cursor

An order cursor displays on waterfall plots; this comprises a number of fixed cursor lines running along the available orders in the waterfall spectra. This is only available if the data includes a recorded speed value, for example, from the Run up /Coast down module.

To display an order cursor:

- Select the **Cursor** menu's **Order cursor** option or press **Ctrl-G.**

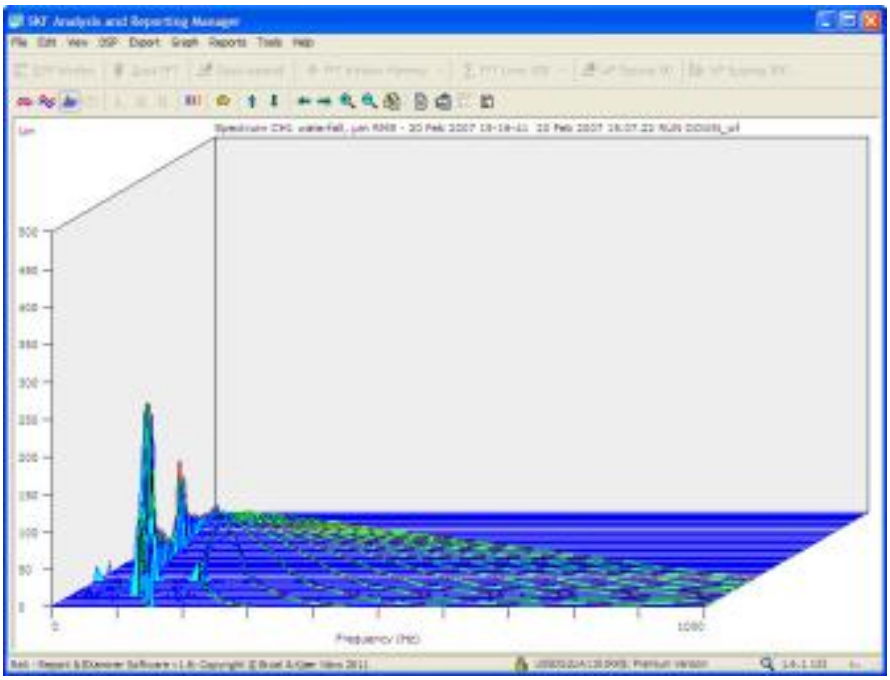

Figure 4 - 48.
Order Cursor Option.

When you display an order cursor on a waterfall plot, ARM automatically selects the number of orders to display based on the smallest number of orders of any of the spectra in the plot multiplied by two. For instance, if the smallest number of orders in a spectrum in a run up recording is 10, ARM displays 20 orders.

To override this selection for the current waterfall plot:

- Select the **Cursor** menu's **Number of orders** option. The **Number of order cursors** dialog displays.

Number of Order Cursors

To override this selection for the current waterfall plot:

- Select the **Cursor** menu's **Number of orders** option. The **Number of order cursors** dialog displays.

Figure 4 - 49.
Number of Order Cursors Dialog.

- Enter any positive number, or use the up/down buttons to change the value in increments of one.
- To revert to automatic selection by the program, enter zero.
- Click **OK** to redraw the plot with the selected number of orders in the cursor.

Difference Cursor

The difference cursor comprises two cursor lines, with the difference of the amplitudes between these lines single cursor POINT value.

To display a difference cursor:

- Select the **Cursor** menu's **Difference cursor**, or press **Ctrl+F.**

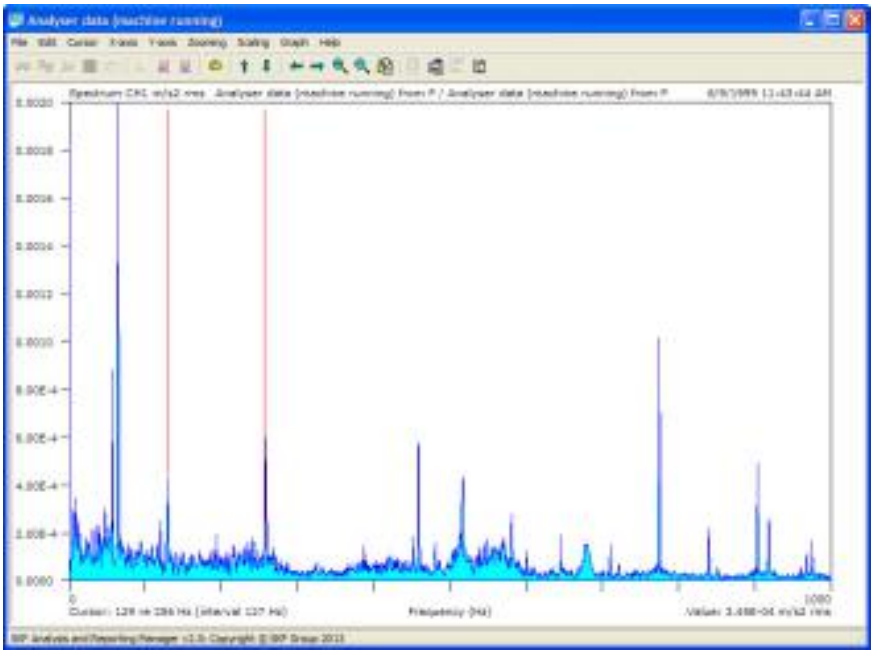

Figure 4 - 50.
Difference Cursor.

When a difference cursor is active, you can move one of the reference lines (initially the right-hand one) using the normal cursor commands. As you move the line, the difference value recalculates.

To control the other reference line:

- Position the mouse over it and **Ctrl+click** the line.

To remove the difference cursor:

- Press **Ctrl+R** again or select another cursor from the **Cursor** menu.

Harmonic Tune Cursor

The harmonic tune (harm-tune) cursor is similar to the harmonic cursor except that the "root" is the upper frequency of the harmonic range.

To initiate a harm-tune cursor:

- Select the **Graph / Cursor / Harm-tune cursor** option, or press **Ctrl+T**. The cursor changes to display harmonics of the current cursor position in a downward direction, dividing the frequency range up to the cursor location into the number of steps.

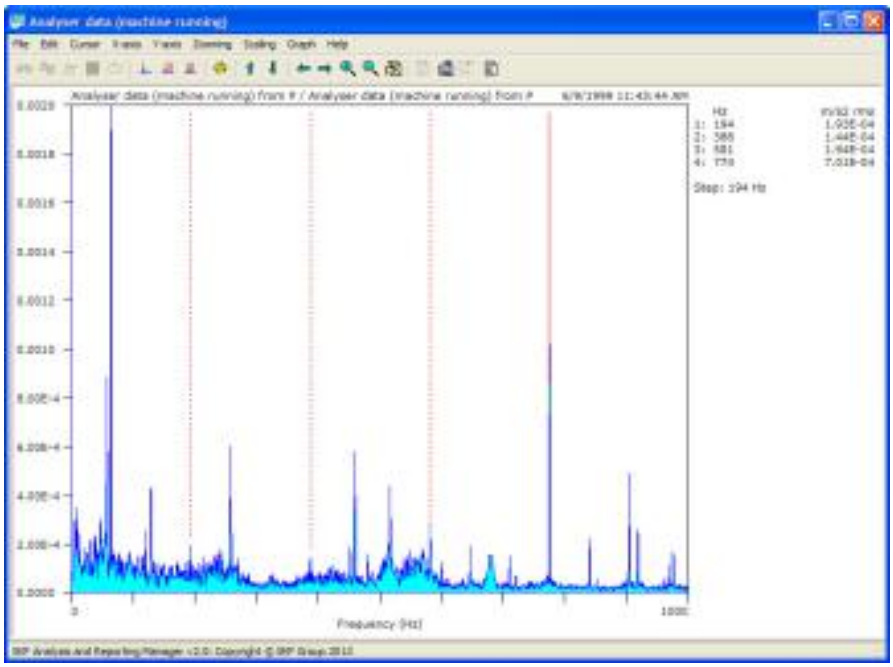

Figure 4 - 51.
Harm-Tune Cursor.

To add or subtract harmonics:

- Select the **Add harmonic** and **Remove harmonic** options on the **Cursor** menu, which display when the harmonic cursor is activated.

Or:

- Press the **Insert** or **Delete** keys on the keyboard.

Press the right and left cursor keys to move the harmonics in small steps, with the lowest harmonic moving one spectral line at a time, and the remainder moving in proportional increments of this.

To remove the harm-tune cursor:

- Press **Ctrl+T** again or use the **Cursor** menu to switch to another cursor style.

Power Cursor

The power cursor is available on Cartesian and waterfall plots and is comprised of two cursor lines, with the "power" of the band between these lines shown on the plot, rather than the single cursor POINT value. The power is calculated from the spectral RSS (root-sum-square) of the values between and including the bounding cursor lines.

To display a power cursor:

- Select the **Cursor** menu's **Power cursor**.

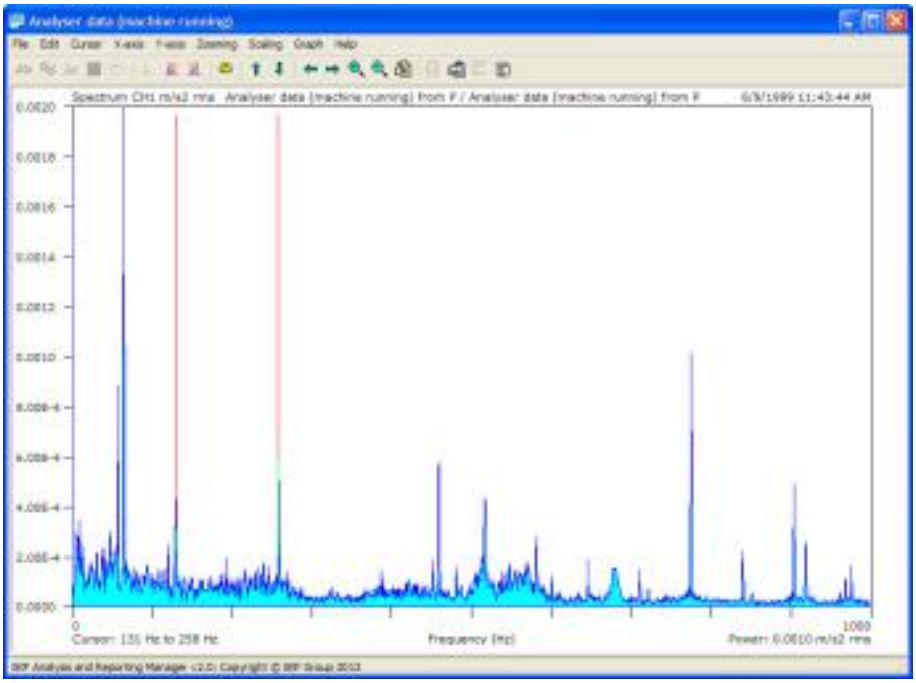

Figure 4 - 52.
Power Cursor.

- The power value calculated is not exactly the RSS of the values between the cursor lines, since an FFT window factor is applied to the result to compensate for the effects of the FFT window used to filter out end-effects on the sample before analysis.

- On Cartesian plots, move one of the bounding lines (initially the right-hand one) using normal cursor commands. As you move the line, the power value recalculates. To control the other bounding line, position the mouse over it and **Ctrl+click** the line.
- On waterfall plots, a bounding zone is drawn on the plot representing the edges of the cursor band. Below the x-axis, at the band edges, the frequency value for the edge is drawn. To move the edges, either click the displayed number with the mouse and drag it to its new position, or double-click to edit the band edges using a window similar to that used to specify zoom values.

Depending on your display settings, the power values for each spectrum are drawn to the right of the spectra or shown on a power level line drawn on the waterfall's left wall. The power level line is also optional.

To remove the power cursor:

- Press **Ctrl+U** or select another cursor from the **Cursor** menu.

Peak-in-Band Cursor

The peak-in-band cursor is available on waterfall plots; this comprises two cursor lines, with the peak level of the band between these lines shown on the plot. You can also have a cursor that shows both the peak- in-band and the band power at the same time.

To display a peak-in-band cursor:

- Select the **Cursor** menu's **Peak in band cursor** option. A bounding zone is drawn on the plot representing the edges of the cursor band; below the x-axis at the band edges, the frequency value for the edge is drawn.

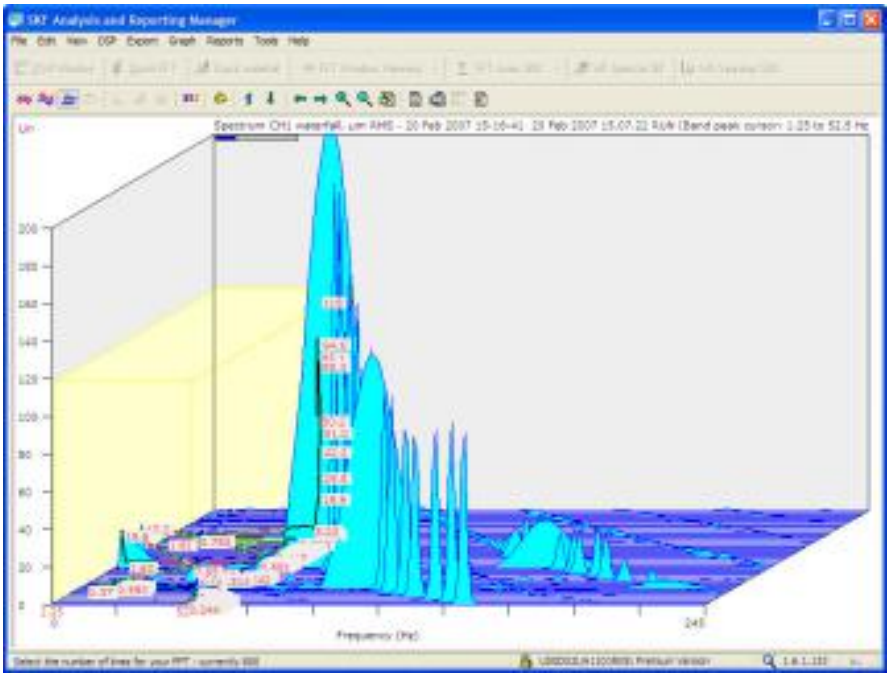

Figure 4 - 53.
Peak-in-Band Cursor.

- To move the edges, either click the displayed number with the mouse and drag it to its new position, or double-click to edit the band edges using a window similar to that used to specify zoom values.

Depending on your display settings, the peak values for each spectrum are drawn to the right of the spectra or shown on a power level line drawn on the actual spectrum peaks.

To remove the peak-in-band cursor:

- Press **Ctrl+U** or select another cursor from the **Cursor** menu.

Waterfall Spectral Slice

On waterfall plots, you can output all of the cursor values to a text window or you can use the cursor values to generate a waterfall spectral slice.

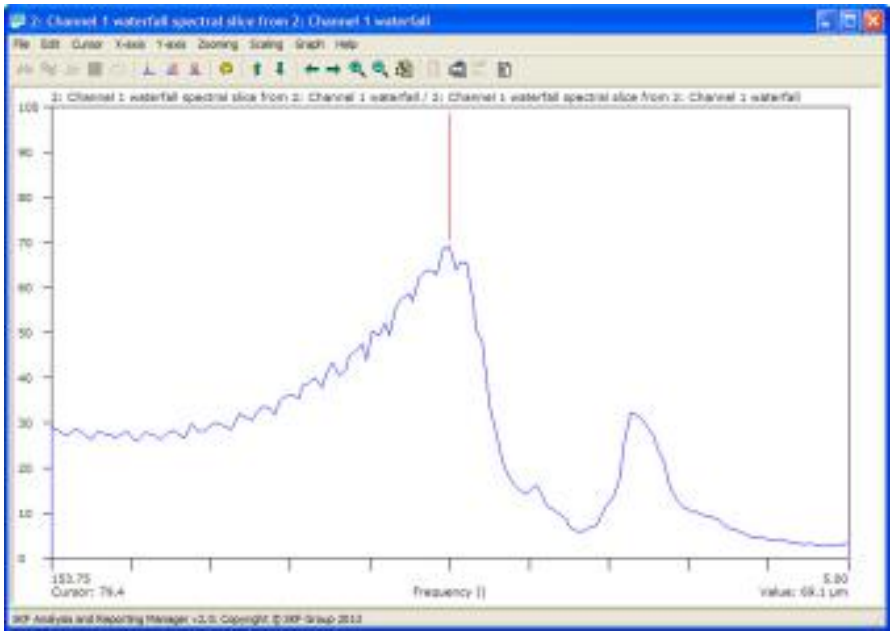

Figure 4 - 54.
Waterfall Spectral Slice.

To generate a waterfall spectral slice:

- Place your cursor at the required position and select **Graph / Cursor** / **Waterfall spectral slice** from the main menu or from the pop up menu. The new record displays automatically.

To output the cursor values to a text window:

- Select **Graph / Cursor / Output cursor values**.

If there is speed variation in your data so that the cursor does not line up exactly on the peaks, you can use the **Cursor to peak** command (or **Alt- P**) to make the cursor jump to the nearest peak value within a narrow band around its current position. You may press **Alt-P** several times, if necessary, to get the required positions. When you do this, the cursor label is marked as **Peak tracked**.

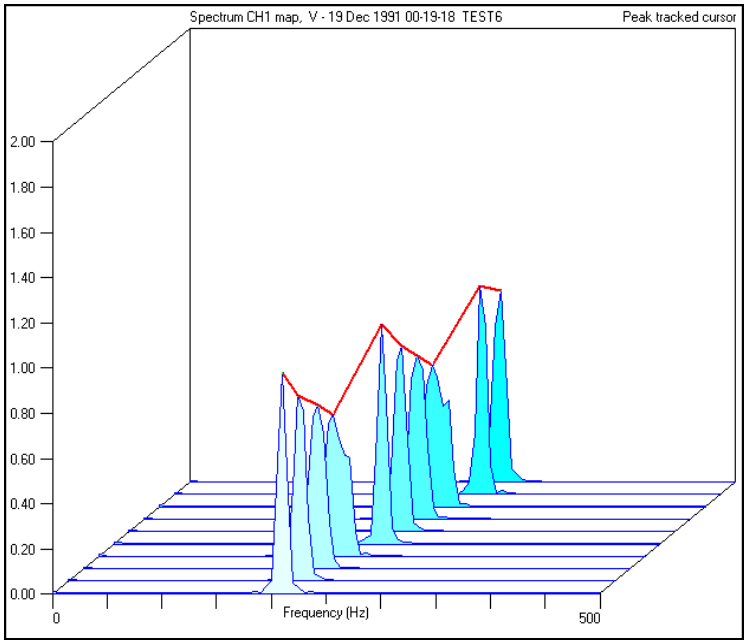

Figure 4 - 55.
Peak Track.

You may also move individual cursor positions by moving the mouse over the spectrum/cursor point required, then dragging the mouse while holding down the **Ctrl** key.

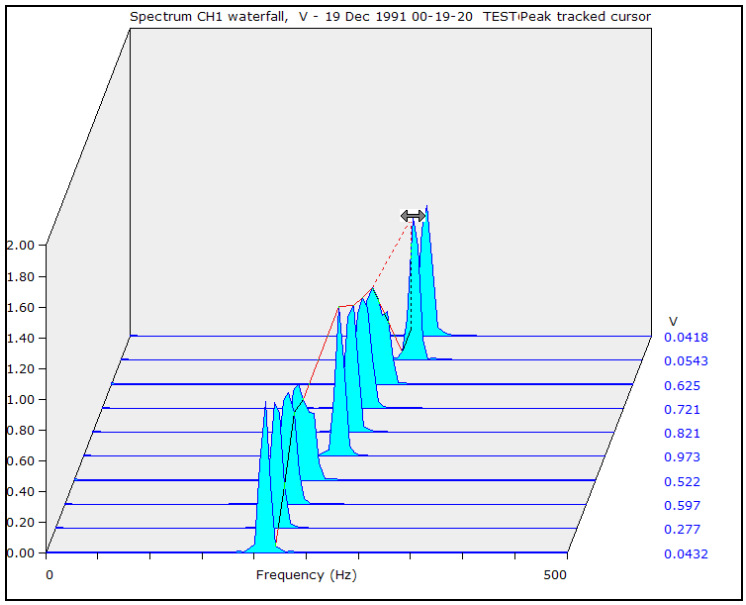

Figure 4 - 56.
Individual Cursor Positions.

When you release the mouse, the line moves to its new location.

- To return to normal cursor position mode, simply move the cursor with the mouse or keyboard.

Notes and Annotations

Annotation Editor

You can add any number of annotations to your data plots. Unlike notes, annotations "belong" to the record on which they are placed. You must place annotations on the plot relative to the data, which makes it necessary to bind the annotation to that data. The only exception is for orbit and polar plots, since the placement of annotations on these plots is relative to two traces; for this reason, orbit and polar plots have their own, separate annotations.

Annotations comprise a number of different elements: the text of the annotation itself, its position (defined in terms of the numerical units of the trace), a typeface used for its display, and a visibility control. All of these parameters are set from the **Annotation editor**.

- Annotations on waterfall plots are tied to the trace in the map nearest its current position.

To add an annotation to a plot:

- Right-click the position where you want to place the annotation and click **Edit / add annotation** from the right-click menu. The **Annotation editor** displays, with the current coordinates displaying as the default **X** and **Y** positions.

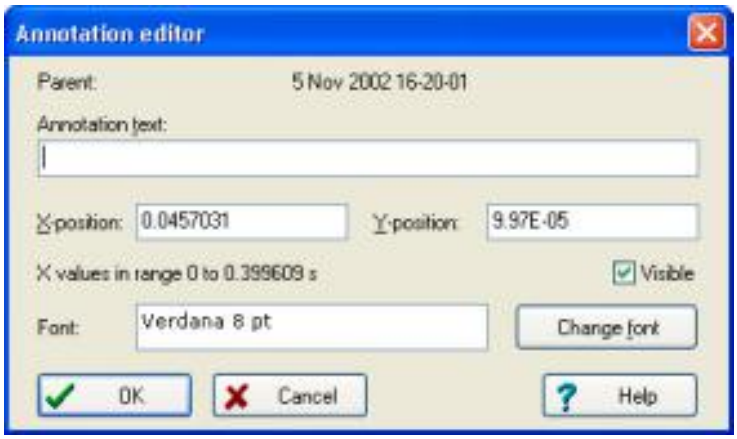

Figure 4 - 57.
Annotation Editor Dialog.

Enter the values in the fields described below. Fields include:

Annotation text - Enter the annotation text that you wish to appear on the plot.

X-position / Y-position - Enter the desired annotation position.

Visible - Disable to temporarily hide the annotation.

Font - Select the annotation's font. Click **Change font** to select a different typeface (the initial typeface will be the same as used for the plot; thereafter, subsequent annotations will take the typeface of the previous).

- Click **OK**. ARM displays the annotation on the plot.

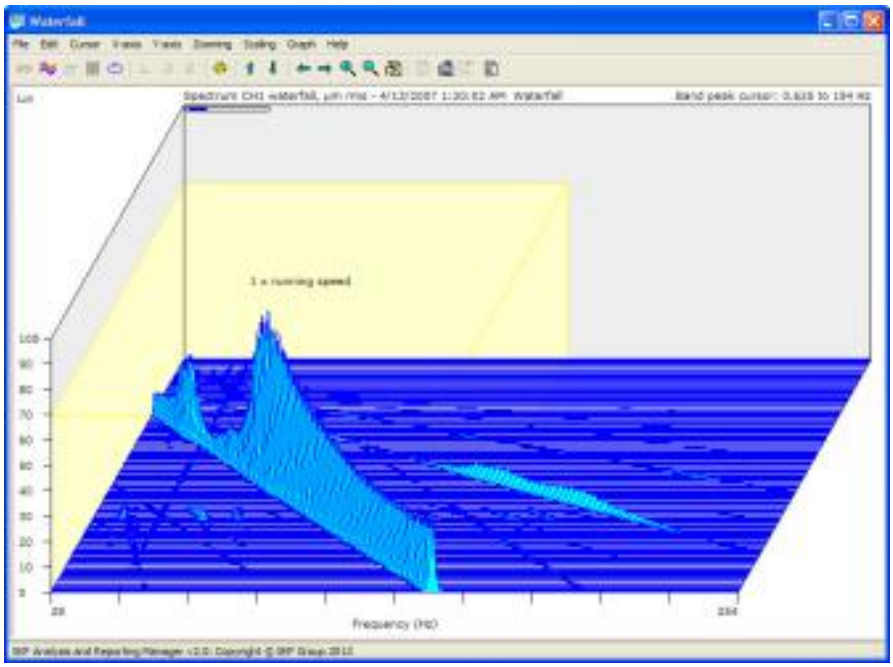

Figure 4 - 58.
Annotation Plot.

To relocate an annotation:

- Click the annotation and drag it to the desired location.
  - ➢ As annotations are placed relative to the data, when you magnify or zoom the plot, the annotation will move with the data.

To edit an annotation:

- Double-click an existing annotation to display the **Annotation editor** and make the necessary changes.

To delete an annotation:

- Click and drag the annotation off the plot. The cursor changes to an "X".
- Release the annotation. A message displays, prompting you to confirm the deletion.

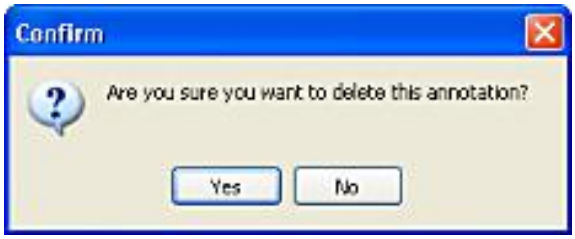

Figure 4 - 59.
Confirm Dialog.

You can also create, edit, and delete annotations using the **Graph / Annotations** menu options. If you choose to edit or delete an annotation, when there is more than one annotation on the plot, a **Select annotation** window displays.

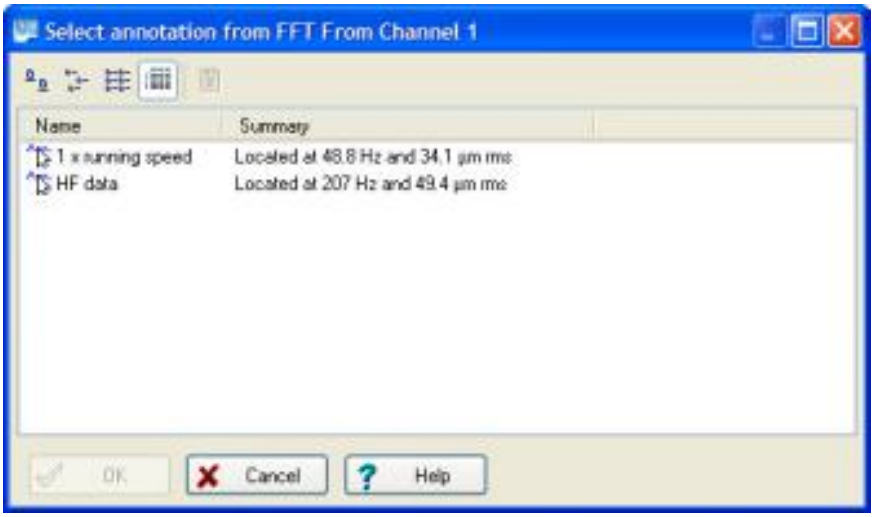

Figure 4 - 60.
Select Annotation Window.

Enter Notes

The **Enter notes** dialog allows you to type, copy/paste from the clipboard, load from a file, or use field codes to extract information from the data into the notes.

Figure 4 - 61.
Enter Notes Dialog.

To apply a note:

- From the menu, select **Edit / Notes**.
- Enter the note you wish to display on the plot in the **Notes for record** text box.
- Enable the **Notes visible** checkbox. If disabled, the note is temporarily hidden.
- Click the **Field** button to display the **Insert a field** dialog, from which you can select a field code to insert in the **Notes for record** text box.
- Click the **Load** button to display the **Select text file** dialog, from which you can select an ASCII / text file. The text from this file is inserted into the **Notes for record** text box and replaces all existing text.

Figure 4 - 62.
Insert a Field Dialog.

Insert a Field Dialog

The **Insert a field dialog** allows you to add a field code to a note.

To add a field code to a note:

- Click the **Field** button on the **Enter notes** dialog. The **Insert a field** dialog displays.
- Select a field from the list of available field codes. The selected field code displays in the **Field code** text box below the list.
- Click **OK**. The selected field code is inserted into the **Enter notes** dialog's **Notes for record** text box.
    - If you use the **%E** field code, you should follow this with the date/time specifier required to format the record date/time. Otherwise, the field is formatted the same as the default date/time field code, **%D**.

The following show the date/time formatting strings available when applying a field code of **%E..%** to record notes:

d Displays the day as a number without a leading zero (1-31).

dd Displays the day as a number with a leading zero (01-31).

ddd Displays the day as an abbreviation (Sun-Sat) using the strings given by the ShortDayNames global variable.

dddd Displays the day as a full name (Sunday-Saturday) using the strings given by the LongDayNames global variable.

m Displays the month as a number without a leading zero (1-12). If the **m** specifier immediately follows an **h** or **hh** specifier, the minute rather than the month displays.

mm Displays the month as a number with a leading zero (01-12). If the **mm** specifier immediately follows an **h** or **hh** specifier, the minute rather than the month displays.

Mmm Displays the month as an abbreviation (Jan-Dec) using the strings given by the ShortMonthNames global variable.

mmmm Displays the month as a full name (January-December) using the strings given by the LongMonthNames global variable.

yy Displays the year as a two-digit number (00-99).

yyyy Displays the year as a four-digit number (0000-9999).

h Displays the hour without a leading zero (0-23).

hh Displays the hour with a leading zero (00-23).

n Displays the minute without a leading zero (0-59).

nn Displays the minute with a leading zero (00-59).

s Displays the second without a leading zero (0-59).

ss Displays the second with a leading zero (00-59).

z Displays the millisecond without a leading zero (0-999).

zzz Displays the millisecond with a leading zero (000-999).

am/pm Uses the 12-hour clock for the preceding **h** or **hh** specifier, and displays “am” for any hour before noon, and “pm” for any hour after noon. The **am/pm** specifier can use lower, upper, or mixed case, and the result displays accordingly.

a/p Uses the 12-hour clock for the preceding **h** or **hh** specifier, and displays “a” for any hour before noon, and “p” for any hour after noon. The **a/p** specifier can use lower, upper, or mixed case, and the result displays accordingly.

ampm Uses the 12-hour clock for the preceding **h** or **hh** specifier, and displays the contents of the TimeAMString global variable for any hour before noon, and the contents of the TimePMString global variable for any hour after noon.

'xx'/"xx" Characters enclosed in single or double quotes are displayed as-is and do not affect formatting.

Global Editing

Global Editing Overview

A global edit is a change that applies to all of the records in the selected data structure, including applying selected settings to every plot in every record; and applying notes to all possible display types and individual plots within each record.

Some edits do not apply to all data types; for instance, choosing a frequency axis notation of CPM does not affect time-domain readings; no damage can be done in these cases since the settings are stored but ignored.

To apply a global edit:

- Select the root node of the data structure and then choose from the **Graph** menu's various options.
- Before ARM applies the edit, confirm that you wish to proceed with the operation.

Global Editing Expert Wizard

The **Global editing expert** wizard guides you through the process of selecting and applying a global edit to the selected data structure. The specified parameters apply to all records in this data structure. If a parameter does not apply to a particular record, the edit has no affect on that record.

Figure 4 - 63.
Global Editing Expert Wizard.

To apply global edits using the Global editing expert wizard:

- Select the **Edit** menu's **Global editing expert** option. The **Global editing expert** wizard introduction page displays.
- Click **Next**. The **Select global edit** page displays.

Global Editing Expert – Select

The **Select global edit** page displays a list of parameters to edit for all records in the selected data structure.

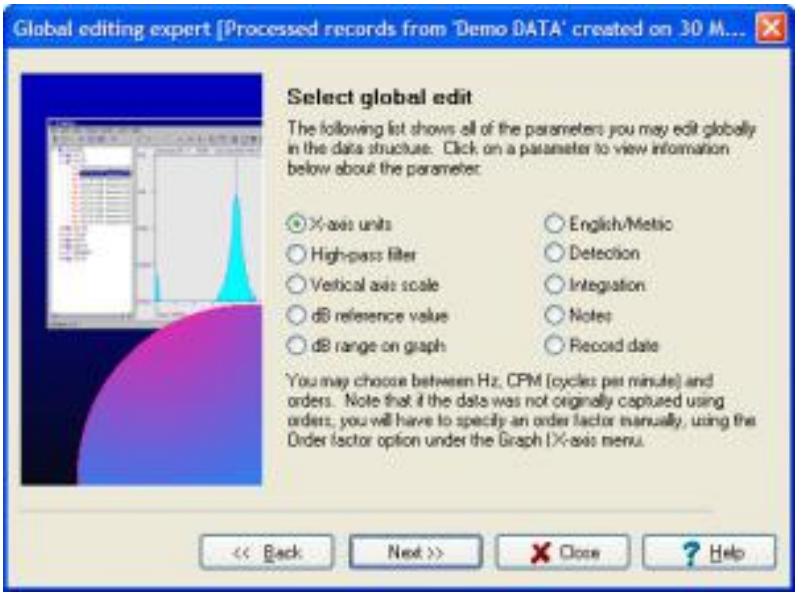

Figure 4 - 64.
Global Editing Expert – Select Global Edit Page.

The following parameters are available:

X-axis units - For frequency domain data, select Hz, CPM, or Orders.

High-pass filter - For frequency domain data, apply a non-destructive high-pass filter, or clear any existing filter setting.

Vertical axis scale - For frequency domain data, select linear or logarithmic vertical axis, or to show phase, real or imaginary values (where available).

dB reference value - For data displayed in Decibels, select a reference value for the conversion to dBs.

dB range on graph - For data displayed in Decibels, select the range in dB used on the graph.

English/Metric- Select English or Metric units.

Detection - When using standard units, specify stored and required detection (RMS, Peak, or Peak-to-Peak).

Integration - Display data in Acceleration, Velocity or Displacement.

Notes – Apply notes to all records.

Record date - Apply a selected date and time value to all records.

- Select the parameter to edit globally and click **Next**. The relevant editor page displays.

Global Editing Expert – X-Axis Units

The **X-axis units** page allows you to select the x-axis units to apply to all records in the selected data structure.

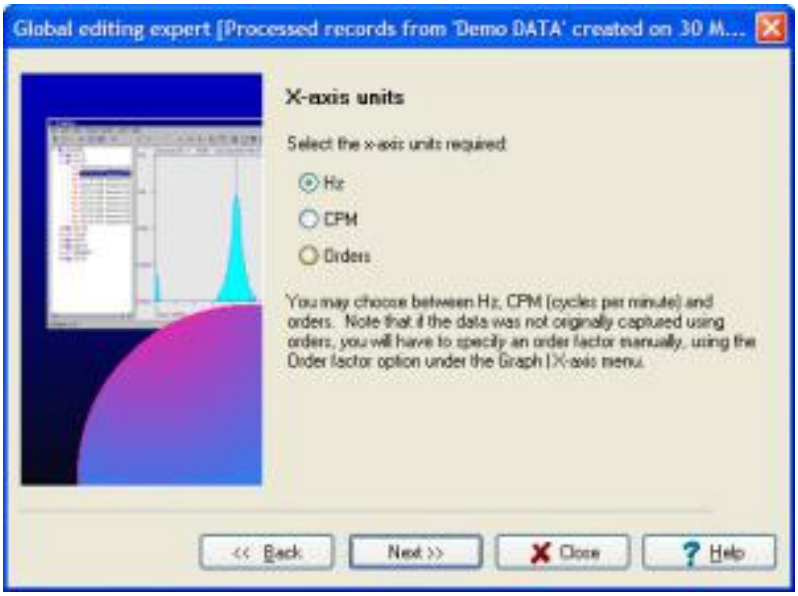

Figure 4 - 65.
Global Editing Expert – X-axis Units Page.

The following parameters are available:

Hz – Change the x-axis units to Hz.

CPM – Change the x-axis units to CPM (cycles per minute).

Orders – Change the x-axis units to Orders.

> ➢ If the data was not originally captured using orders, a default "order factor" is applied, which is equal to 1 Hz = 1 order. To set the order factor for individual records, select the **Graph** menu's **X-axis / Order factor** option.

These settings apply only to frequency domain data and are ignored in any time-domain or notated x-axis records.

- Select the x-axis units.
- Click **Next.** The **Confirm** page displays.

Global Editing Expert – High-Pass Filter

The **High-pass filter** page applies a high-pass filter to all records in the selected data structure. Change the value used or clear the current filter.

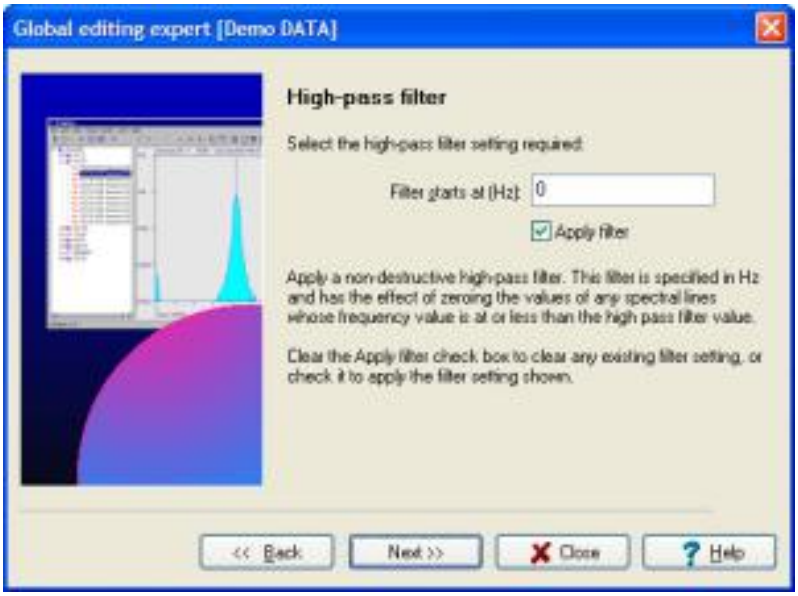

Figure 4 - 66.
Global Editing Expert – High-Pass Filter Page.

To apply a high-pass filter:

- Enable the **Apply filter** checkbox.
- Enter a value for the high-pass filter in the **Filter starts at** text box.
    - ➢ If you disable the **Apply filter** checkbox, the value is ignored and the effects of the filter are canceled in all records (filter frequency values remain in place).

These settings apply only to frequency domain data and are ignored in any time-domain or notated x-axis records.

- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Vertical Scale

The **Vertical scale** page applies a vertical axis scale to all records in the selected data structure.

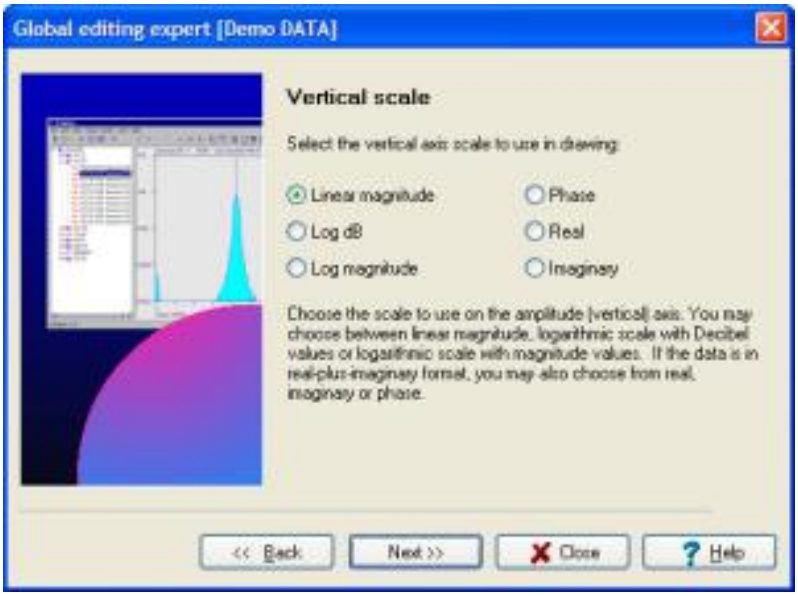

Figure 4 - 67.
Global Editing Expert – Vertical Scale Page.

The following parameters are available:

Linear magnitude – Change the graph to display a linear plot of magnitudes.

Log dB – Change the graph to display a logarithmic plot with values in Decibels.

Log magnitude - Change the graph to display a logarithmic plot with values in magnitudes.

Phase – Change the graph to display a linear plot with values converted to phase.

Real – Change the graph to display a linear plot with the real values.

Imaginary – Change the graph to display a linear plot with imaginary values.

The last three options only apply if the data is complex, (i.e., each spectral line includes a real and an imaginary component). You may combine these to produce the magnitude or phase value for the line, or displayed alone.

These settings apply only to frequency domain data and are ignored in any time-domain records.

- Click **Next.** The **Confirm** page displays.

Global Editing Expert – dB Reference

The **dB reference** page applies a Decibel reference value to all records in the selected data structure.

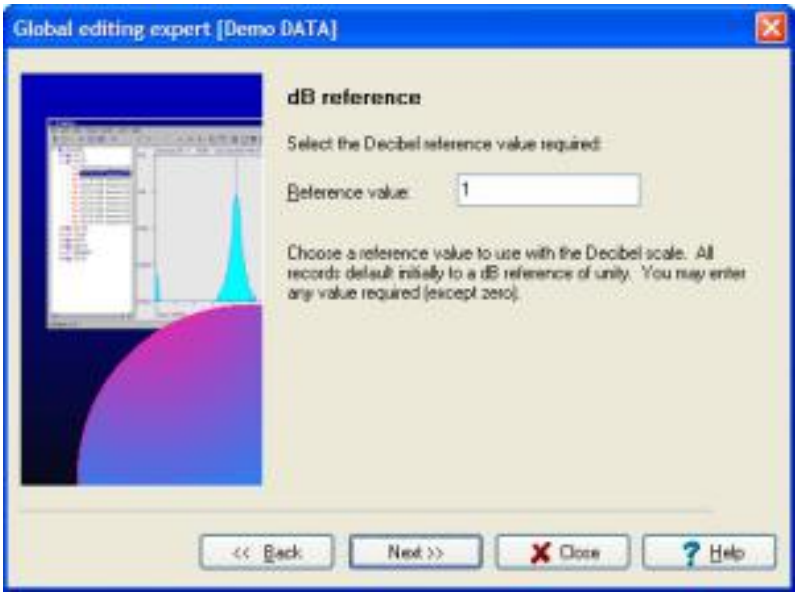

Figure 4 - 68.
Global Editing Expert – dB Reference Page.

- Enter the reference value required in the **Reference value** text box
    - ➢ This value displays in the units currently applied to the record. If you change the units (by integration, for example), the specified reference value displays in the new units of the record.

These settings apply only to data when it is displayed using the Decibel scale and are ignored in all other cases, although the value is still written into the record.

- Click **Next**. The **Confirm** page displays.

Global Editing Expert – dB Range

The **dB range** page specifies the Decibel range used for graph plotting in all records in the selected data structure.

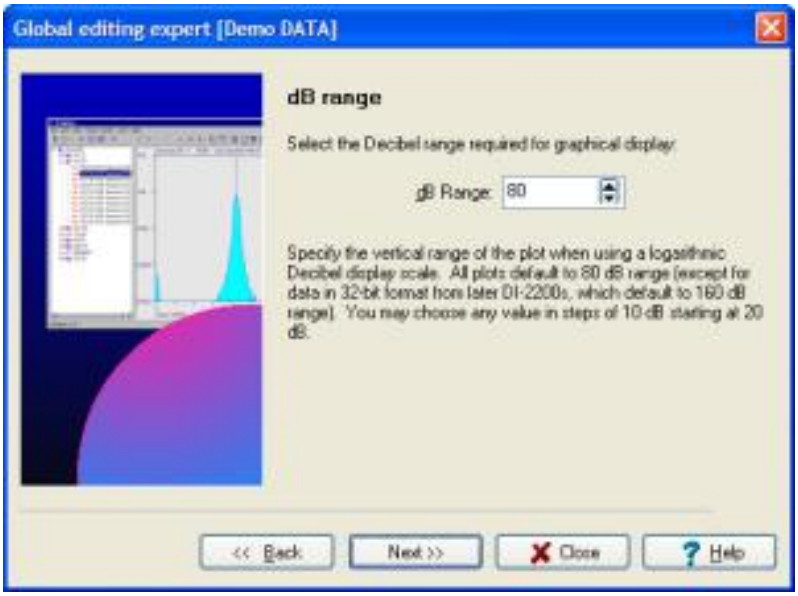

Figure 4 - 69.
Global Editing Expert – dB Range Page.

- Enter the range value required in the **dB Range** text box in steps of 10 dB; the minimum value is 20 dB.

All plots default to an 80 dB range.

When magnifying or reducing the vertical scale on dB plots, the vertical range does not change (unlike in linear plots); instead, the displayed range increases or decreases by 10 dB. Use the **dB Range** setting to zoom in on a specific range of values.

These settings apply only to data when it is displayed using the Decibel scale and are ignored in all other cases, although the value is still written into the record.

- Click **Next.** The **Confirm** page displays.

Global Editing Expert – English/Metric

The **Units system** page specifies the units to apply to all records in the selected data structure that use standard units.

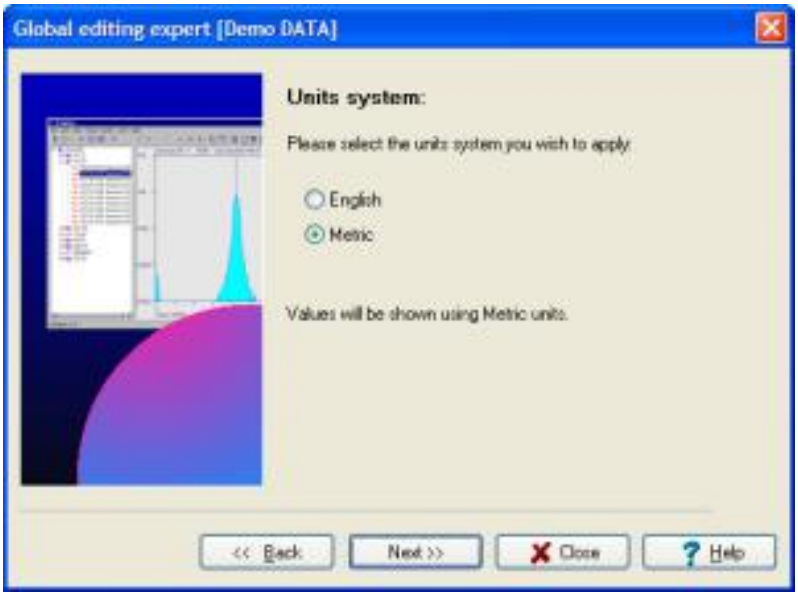

Figure 4 - 70.
Global Editing Expert – Units System Page.

- Choose either **English** or **Metric**.
  - ➢ Acceleration always shows as **g**.
- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Detection

The **Detection** page defines detection scaling (rms, peak, or peak-to-peak) for all records in the selected data structure. This only affects records in the frequency domain using Auto EUs.

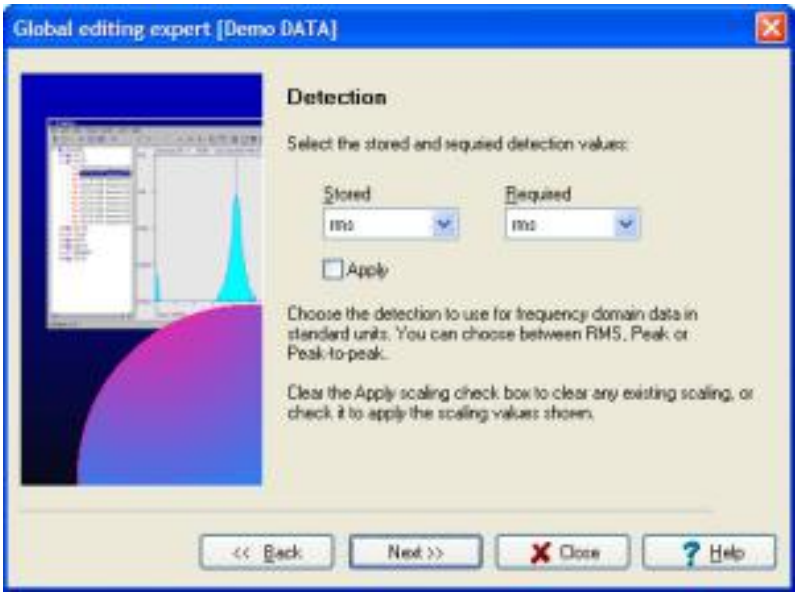

Figure 4 - 71.
Global Editing Expert – Detection Page.

To define detection scaling:

- Enable the **Apply** checkbox.
- Specify the type of scaling in the **Stored** and **Required** drop down lists.
  - If you disable the **Apply** checkbox, these values are ignored and scaling is not applied in all records.
- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Integration/Differentiation

On the **Integration/Differentiation** page, select to view your data in **Acceleration**, **Velocity,** or **Displacement**; each record is integrated or differentiated as appropriate. Note that time domain, uneven x-axis data, or data that does not use standard units is not modified.

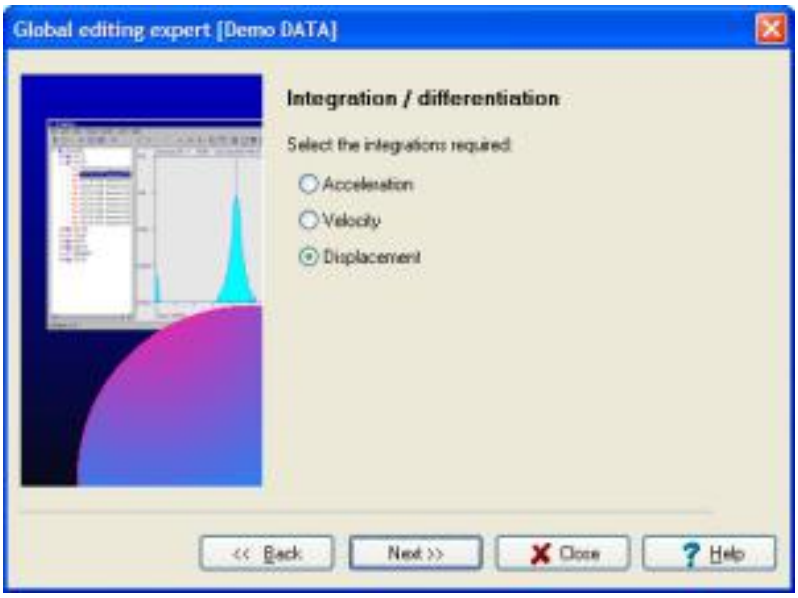

Figure 4 - 72.
Global Editing Expert – Integration/Differentiation Page.

- Select the detection required.
- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Notes

The **Notes** page adds a note to all of the records in the selected data structure.

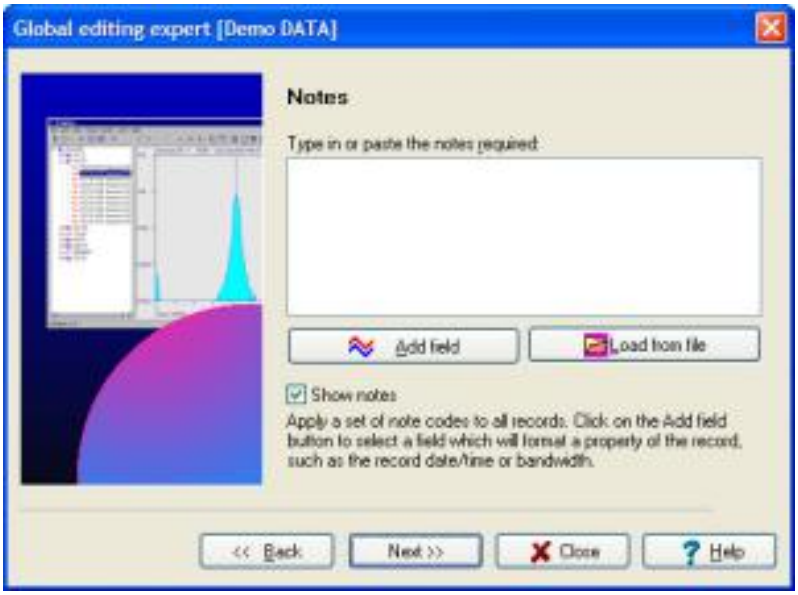

Figure 4 - 73.
Global Editing Expert – Notes Page.

- Notes are actually a property of the display settings for each graph type under the record; therefore, the notes are applied several times for each record.

To apply a note:

- Enter the note you wish to display on the plot in the **Type in or paste the notes required** text box.
- Enable the **Show notes** checkbox. If disabled, the note is temporarily hidden.
- Click the **Add Field** button to display the **Insert a field** dialog, from which you can select a field code to insert in the **Type in or paste the notes required** text box.

Figure 4 - 74.
Insert a Field Dialog.

- Click the **Load from file** button to display the **Select text file** dialog, from which you can select an ASCII/text file. The text from this file inserts into the **Type in or paste the notes required** text box and replaces all existing text.
- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Record Date/Time

The **Record date/time** page specifies the date and time value stored for every plot within the currently selected data structure.

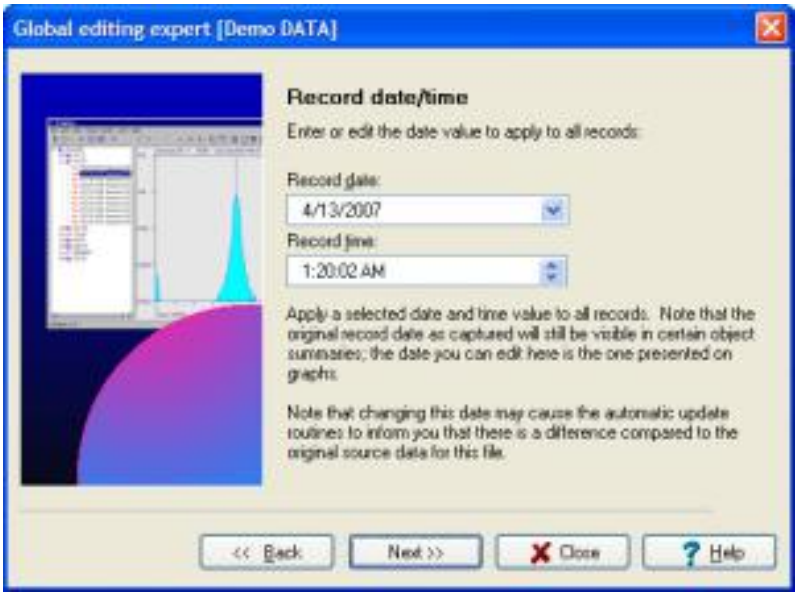

Figure 4 - 75.
Global Editing Expert – Record Date/Time Page.

The current values display in the **Record date** and **Record time** controls.

- Change the dates as required.

The original date and time is visible in certain object summaries; the date edited here is represented on plots.

Changing this date may cause the automatic update routines to inform you that there is a difference compared to the original source data the next time you open the associated data stream file.

- Click **Next**. The **Confirm** page displays.

Global Editing Expert – Confirm

The **Confirm** page displays a summary of the selected global edits.

- Click **Apply** to proceed with the edit. The **Applying edit** page displays.

Global Editing Expert – Finished

When the edit is complete, the **Finished** page displays.

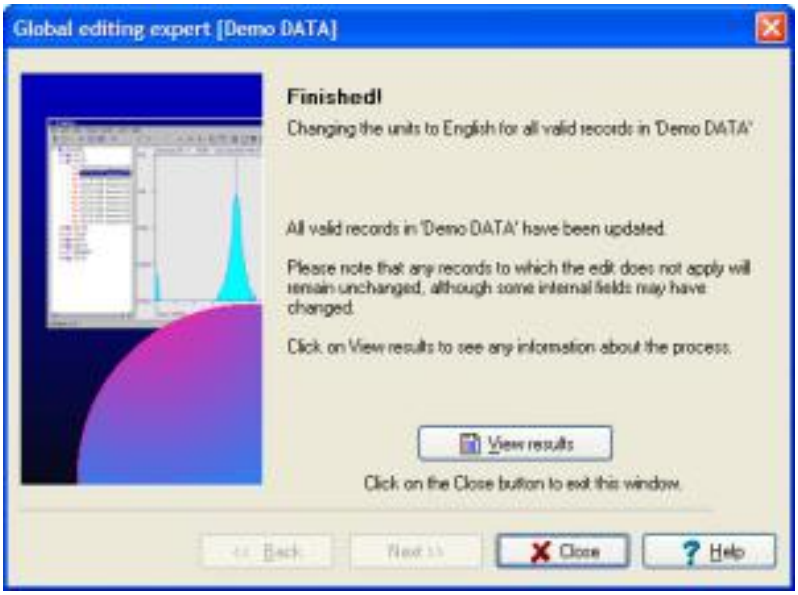

Figure 4 - 76.
Global Editing Expert – Finished Page.

To review the edits:

- Click **View results**. A summary window displays all edits. If you cancelled the edit, this also displays in the summary.

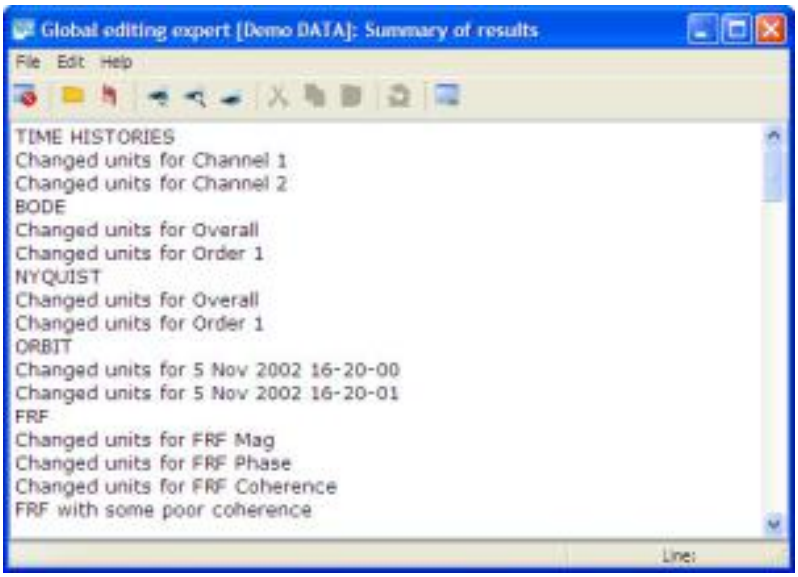

Figure 4 - 77.
View Results.

- Click **Close** to return to the ARM main window.

Global Editing Expert – Applying Edit

The **Applying edit** page displays the progress of the edit. When the edit is complete, the **Finished** page displays.

To cancel the edit:

- Click **Cancel**. You are prompted to confirm that you wish to cancel the edit.
- Click **Yes**. The **Finished** page displays.

Rolling Element Bearing Database

Bearing Database Overview

ARM ships with a rolling element bearing database, allowing you to overlay any number of bearings on a frequency domain plot. Each bearing is factored to a user defined machine running speed and displays its four defect frequencies on the plot.

The four defect frequencies are cage defect, ball defect, outer race defect, and inner race defect.

To assign bearing overlays to a frequency domain plot:

- With a frequency domain plot displayed, click **Edit / Assign Bearing**. The **Bearing selection** dialog displays, allowing you to import bearings from the bearing database, select bearings to overlay on the plot, define the machine's running speed, and view bearing summaries.

Bearing Selection Dialog

> ➢ You must first import bearings from a bearing database before you can add them to the **Bearings selected** list. Reference the *Select a Bearing Dialog* section for details.

Use the **Bearing selection** dialog to select one or more rolling element bearings to display on a frequency domain plot. Each bearing's four defect frequencies are factored with a user defined machine running speed and displayed on the plot.

To access the Bearing selection dialog:

- Open a frequency domain plot.
- Select **Edit / Assign Bearing**. The **Bearing selection** dialog displays.

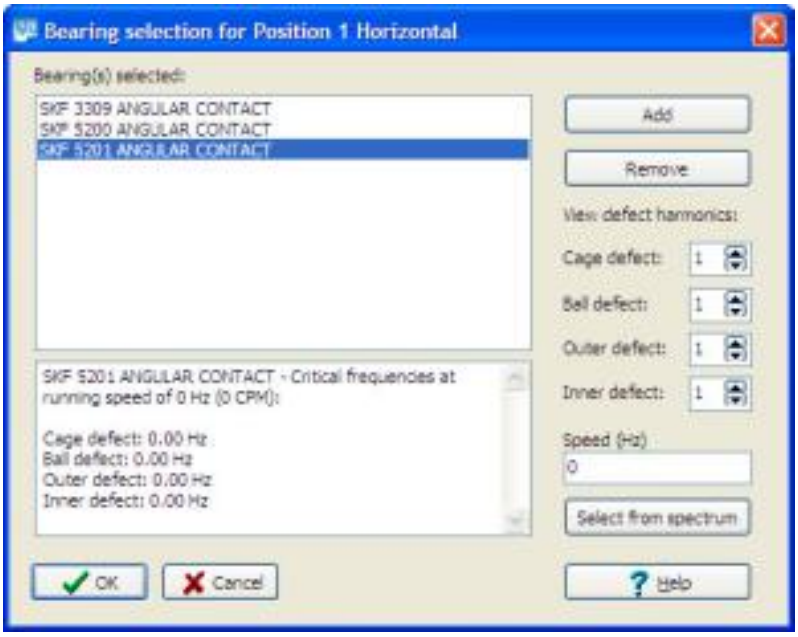

Figure 4 - 78.
Bearing Selection Dialog.

Fields include:

Bearing(s) selected - Displays a list of bearings selected from the bearing database. A summary of the selected bearing displays in the area below the selected bearings list.

View defect harmonics: Cage defect, Ball defect, Outer defect and Inner defect - Select the number of harmonics (0 - n) of each defect frequency shown on the plot for the selected bearing. Selecting 0 will hide the harmonic.

Speed (Hz) - Enter the machine's running speed to determine the four defect frequencies for each bearing displayed on the plot.

Select from spectrum - Click to select a running speed from the frequency plot.

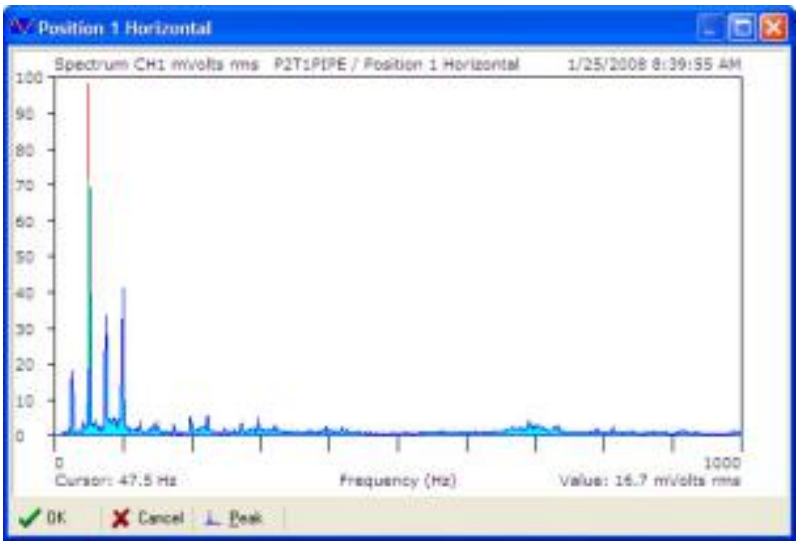

Figure 4 - 79.
Frequency Plot.

To select a running speed from the frequency plot:

- On the frequency plot, place the cursor on the plot to select the running speed, or click **Peak** to automatically move the cursor to the signature peak value.
- Click **OK** to use the running speed of the current cursor location.

Add - Click to display the **Select a bearing** dialog and add bearings to the **Bearing(s) selected** list.

Remove - Click to remove the highlighted bearing from the **Bearing(s) selected** list.

OK - Click to apply the selected bearings' defect frequencies to the frequency plot.

On the frequency plot, each bearing overlay displays in its own color, with dashed lines for each defect frequency.

Cancel - Click to exit the **Bearing selection** dialog. If you have made any changes, you are prompted to save your changes.

Select a Bearing Dialog

Use the **Select a bearing** dialog to import bearings from the bearing database and to add selected bearings to the **Bearing(s) selected** list on the **Bearing selection** dialog.

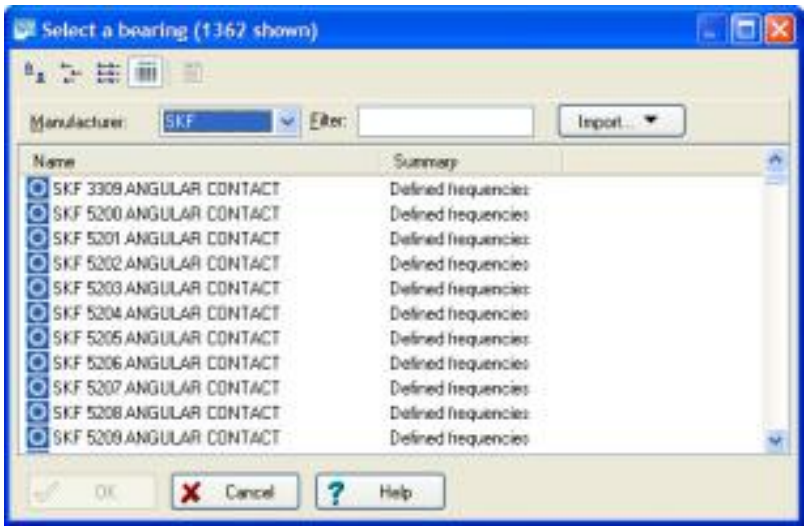

Figure 4 - 80.
Select a Bearing Dialog.

Fields include:

Display options taskbar - Select how to display the list of imported bearings (large icons, small icons, in a list, or in a list with information about each item).

Summary button - Click to output a summary of the selected bearing to a text file. You may save or print this file.

Manufacturer - Displays a list of manufacturers for the imported bearings. Select **All** to display all bearings, or select a specific manufacturer to display only that manufacturer's bearings.

Import - Click this drop down button to select how to import bearings into ARM; you can import an entire bearing database or only specific bearings. Select **Import from database** to

import user-selectable bearings from the main database into ARM. Select **Import from CSV** to import a bearing database (.csv) file into ARM.

> ➢ The CSV file must contain data in the following format:
> MANUFACTURER NAME,PART NUMBER,CAGE FREQUENCY,BALL SPIN FREQUENCY,OUTER RACE DEFECT FREQUENCY,INNER RACE DEFECT FREQUENCY

All frequencies must be specified in Hz and are relative to a running speed of 60 RPM. Also, there must not be any commas in the manufacturer or part number fields, otherwise the data will import incorrectly.

To import bearings from a bearing database (.csv) file:

- On the **Select a bearing** dialog, click **Import / Import from CSV**.
- Browse to and select a bearing database and click **Open**. A message displays indicating how many bearings are available for import.
- Click **Yes** to proceed with the import. Once the import has completed, a message displays indicating how many bearings were actually imported.
- Click **OK**. The newly imported bearings display in the list.

To import only selected bearings from a bearing database:

- On the **Select a bearing** dialog, click **Import / Import from database**. Another **Select a bearing** dialog displays.
- Click the bearing(s) to import into the database and click **OK**. Only the selected bearing(s) will copy from the main database into your local copy.

To add bearings to the Bearing(s) selected list:

- On the **Bearing selection** dialog, select a bearing and click **OK**. The **Bearing selection** dialog displays and the selected bearing appears in the **Bearing(s) selected** list.
  - ➢ You can only add one bearing to the **Bearing(s) selected** list at a time.

Viewing Bearing Overlays

Each selected bearing's defect frequencies display on the plot, indicated by colored dashed lines. Each color represents a bearing, and each defect frequency is represented by a dashed line with the defect frequency initials displayed at the top of the dashed line (Fc (cage), Fb (ball), Fi (inner race), and Fo (outer race)).

Place your mouse cursor on the dashed line to display the bearing's manufacturer and part number, running speed, and defect type in the status bar at the bottom of the screen.

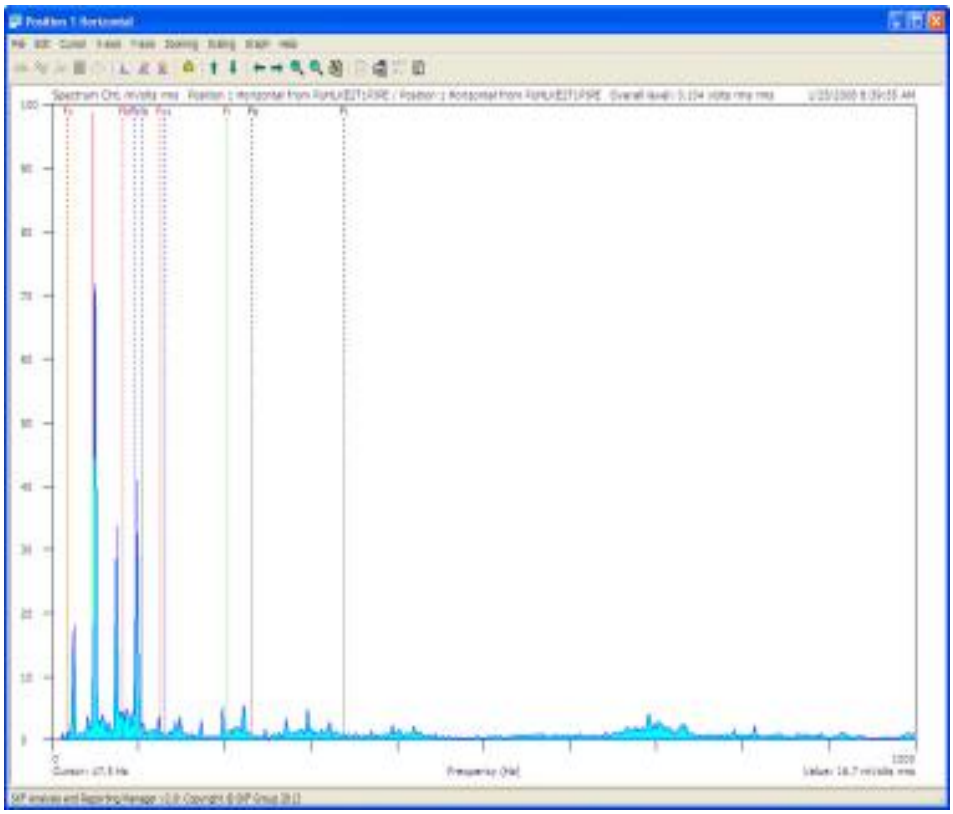

Figure 4 - 81.
Bearing Overlays.

To remove a bearing from the plot:

- Click **Edit / Assign bearing**. The **Bearing selection** dialog displays.
- Select the bearing you wish to remove from the **Bearing(s) selected** list and click **Remove**.

Calculating gE Overall Limits

ARM has the ability to calculate enveloped (gE) overall limits and store the calculations with the data. If you select an enveloped spectrum, the **Edit / Edit date and speed** option changes to the **gE Alarm Calculator/Record date** option. Selecting this option displays the **gE Calculator** dialog.

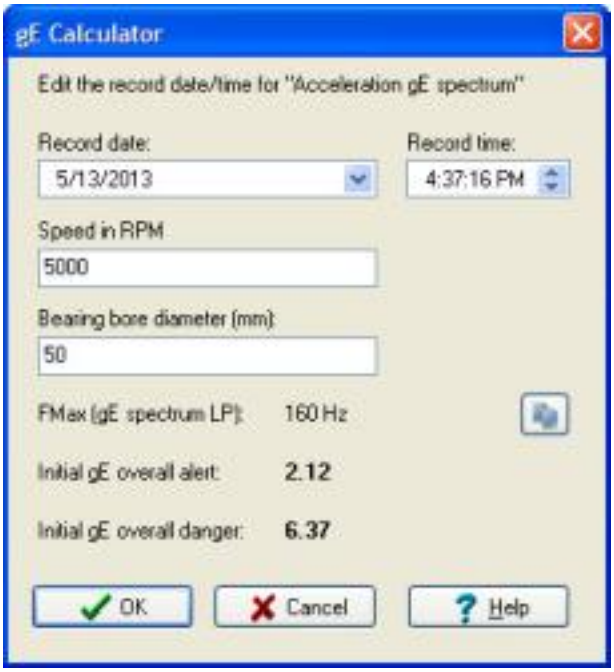

Figure 4 - 82.
gE Calculator Dialog.

To calculate the gE overall limits:

- Select an enveloped spectrum.
- Click the **Edit / gE Alarm Calculator/Record date** option. The **gE Calculator** dialog displays.
- Enter the speed, RPM, and bearing bore diameter. The values automatically calculate.

The formula takes the speed, Fmax, and bearing bore diameter and gives recommended gE overall levels, which show at the bottom of the dialog. If setting up a condition monitoring system, this gives guidance on how to set your initial overall level settings for gE points (in SKF @ptitude Analyst). The data is stored in the record.

To copy the recommended gE overall limits:

- Click the **Copy** icon to the right of the calculations on the gE Calculator dialog. The results copy to the clipboard.
- Paste the data into an application of your choice (condition monitoring database, Notepad, etc.).

5
Digital Signal Processing

Digital Signal Processing

The Digital Signal Processing (or DSP) Module provides several post-processing features, including Fast Fourier Transform (FFT) analysis, waterfall analysis, and enveloped acceleration (gE) analysis.

All FFT, waterfall, and enveloped analysis options are accessible from the **DSP** menu.

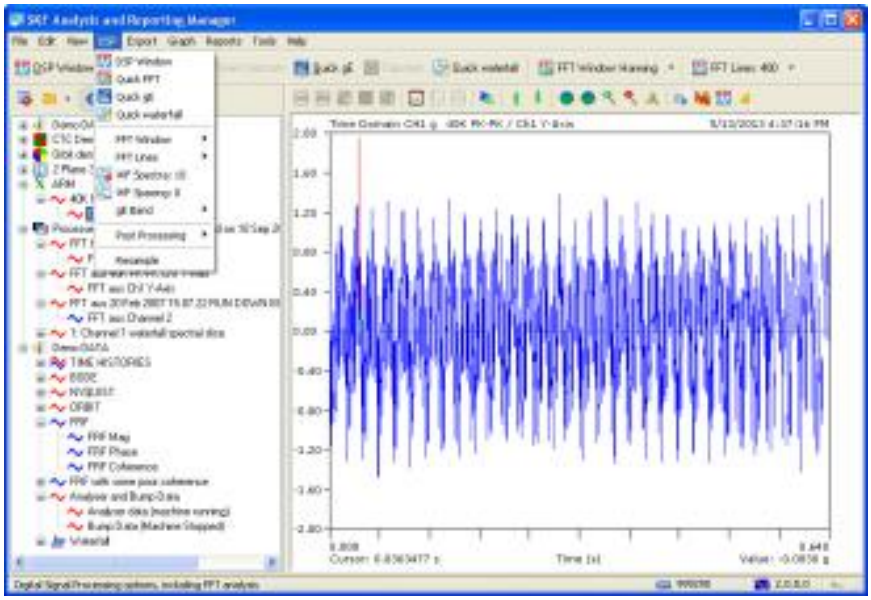

Figure 5 - 1.
Digital Signal Processing Module.

To select an item on the DSP menu:

- On the left panel, select the record you wish to process.
- Select a processing option from the **DSP** menu.
    - ➢ The available options depend on the level of item selected in the left panel. The first level represents the entire data structure (one or more sets of data); the second level represents a single piece of data (or measurement), containing one or more channels of information; and the third level represents a single measurement channel. The following example shows a second level selection, containing two measurement channels.

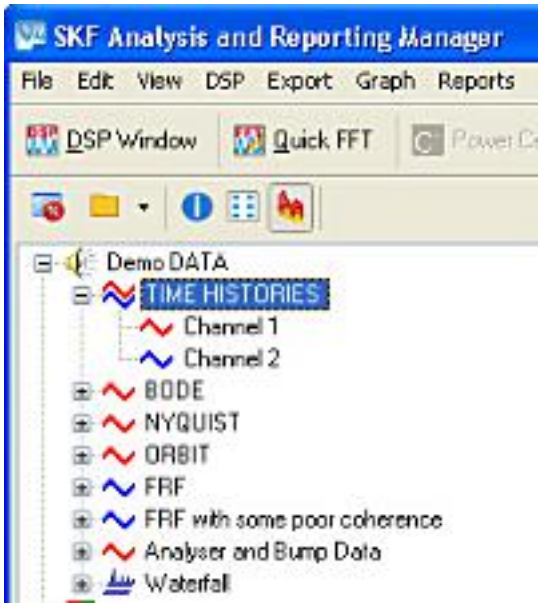

Figure 5 - 2.
Second Level Selection.

The table below displays the available options for each level:

Selection	DSP Window	Quick FFT	Quick Waterfall
First	Processes first measurement only	Available only if all measurements in data structure are time domain; creates one FFT per waveform	Available only if all measurements in data structure are single channel time domain; creates one waterfall per waveform
Second	Available if all channels are time domain	Available if both channels are time domain	Available if single channel time domain
Third	Available if time domain	Available if time domain	Available if time domain

- The **Quick Waterfall** option is not available if the **FFT Lines** control is set to **Entire record**.

The **Quick FFT** and **Quick Waterfall** options process all records in the data structure at once if selecting the first level node. The resulting output mirrors the structure of the original data structure if output to a new data structure.

The Digital Signal Processing Window

This **Digital Signal Processing** window allows you to post-process time waveform data using FFT routines.

This window allows you to process your time series (waveform) data in one of four ways:

1. A single spectrum created from the entire waveform.
2. A single spectrum created from a portion (between cursors) of the waveform.
3. A waterfall plot created from processing successive segments of the waveform into spectra. This can be averaged into a single spectrum; or for readings containing a second channel with trigger information, the waterfall may be processed using speed control.
4. An enveloped spectrum (gE spectrum) from an input signal. The gE spectrum takes high frequency data and band-pass filters it, demodulates and rectifies it, and then breaks it down into a spectrum.
   - ➢ The input signal's sampling rate must be 40 000 Hz to allow for enveloping analysis.

You may also choose from a selection of FFT window filters, including Hanning and Hamming.

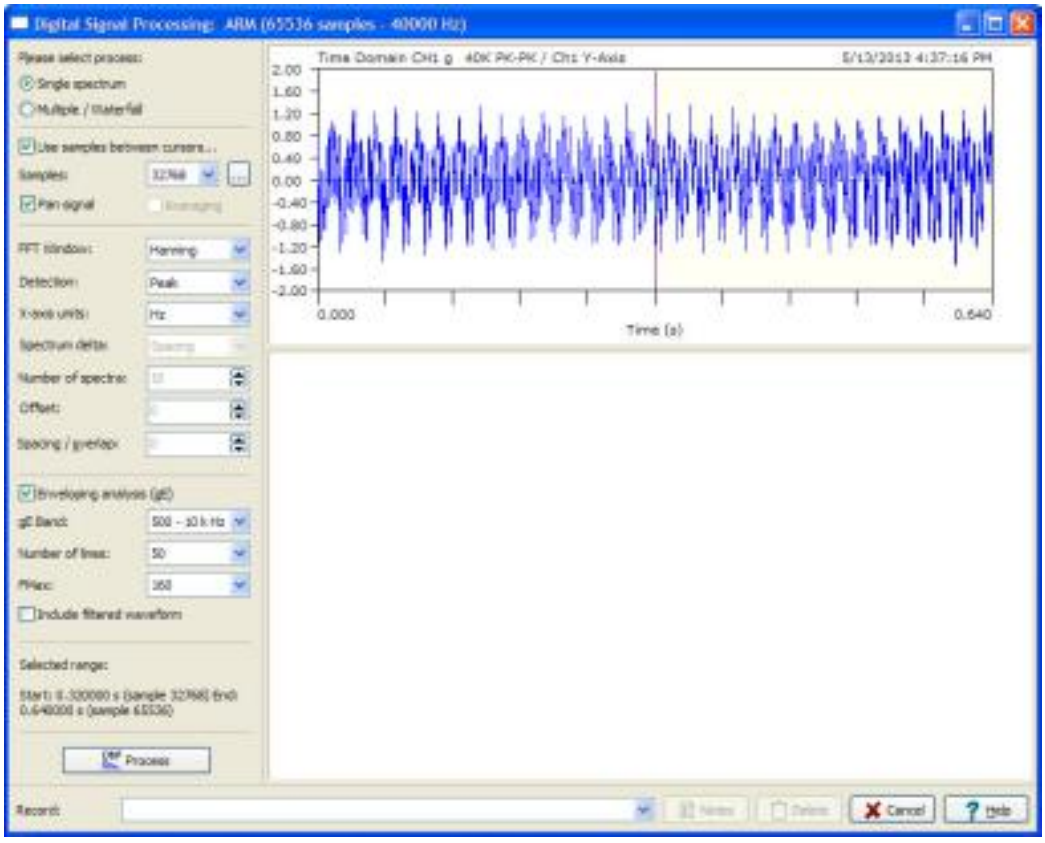

Figure 5 - 3.
FFT Window.

Fields include:

Please select process:

Single spectrum – Uses the entire waveform to produce the spectrum (uses the nearest power of two below the number of samples). If you select the **Single spectrum** option, the **Use samples between cursors** and **Enveloping analysis (gE)** options become available.

Multiple / Waterfall – Creates a waterfall plot from your data; numerous processing options are available, depending on whether your data includes a trigger channel and represents steady state or a run up / coast down recording. If you select the **Multiple / Waterfall** option, the **Select signal**, **Select trigger**, and **Samples** options become available, as well as the **Autofit** button.

Select signal – Select the channel containing the signal to be processed (applies to data sets with more than two channels).

Select trigger – Select the channel containing the trigger signal used to supply speed information (applies to data sets with more than two channels).

Use samples between cursors – Creates the spectrum from a section of the waveform. If you select this option, the **Samples**, **Pan signal**, and **Averaging** options become available.

Samples – Specify how many samples to use for each spectrum. The options are limited to the maximum value available.

- The limit to the number of samples to use for a spectrum is 262 144, which gives a maximum spectrum length of 102 400 lines; therefore, if the source data contains more than 262 144 samples, this field will only show options up to and including 102 400 samples.

Range – Click the browse button next to the **Samples** field to specify the start and end values of the sample portion.

Pan signal –Select this option to advance the selected region of the waveform each time a spectrum is created; this allows you to pan across the waveform creating multiple spectra.

Averaging - Enable to create a single, averaged spectrum from the waterfall. When you click **Process**, the required number of spectra is created, then averaged together to produce a single spectrum.

FFT Window – Specify a window filter: Rectangular, Parzen, Hanning, Welch, Hamming, Flat Top, or Exact Blackman.

Detection – Specify amplitude scaling on the results: RMS, Peak, or Peak-to-Peak.

X-axis units – Specify frequency units for the output; if you are working on triggered data or the source waveform includes a speed measurement, you may choose to normalize your output to orders.

Spectrum delta – For waterfall plots, select between a fixed number of spectra or use time or speed changes ("delta RPM") to process the data.

Number of spectra – Specify the number of spectra to display.

Offset – Specify the offset value to skip data at the start of the recording.

Spacing/overlap – Specify a value to control the spacing.

Enveloping analysis (gE) - For a single spectrum output, create an enveloping (gE) spectra and waveform based on the band, number of lines, Fmax, and filter waveform. If you set up a gE point, you can choose to save the demodulated waveform as well.

Informational area - The bottom portion of the left pane displays instructions or context information, such as the selected range and number of samples. When you move the cursor over a plot, this area updates to show the functions you can perform.

DSP Process – Click to process your data.

Record – Displays the spectrum or waterfall produced in the lower graph panel and updates to the list of produced data.

Notes – Add notes to the displayed data.

- Click **OK** to save the data.

Single Spectrum from Full Waveform

To display a single spectrum from the full waveform:

- Select the **Single spectrum** option from the **Please select process** control.
- Select the **FFT Window** filter (Rectangular, Parzen, Hanning, Welch, Hamming, Flat Top, or Exact Blackman), **Detection** (RMS, Peak or Peak-to-Peak) and **X-axis units** (Hz, CPM or Orders) values as required.
- Click the **DSP Process** button. The output spectrum displays in the lower panel.

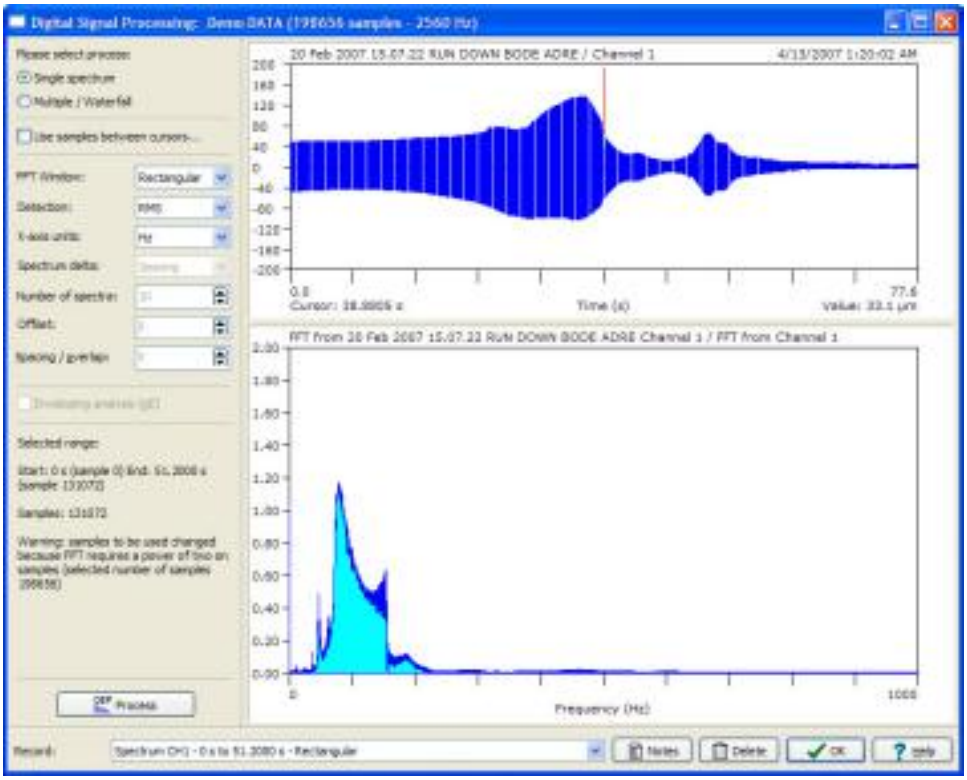

Figure 5 - 4.
Spectrum Display.

Both the input and output graphs are fully functional and respond to mouse commands in the same way as graph plots in the main application window.

> ➢ As the FFT requires a number of lines of input that is equal to some power of two, the routine may choose less than the entire waveform for its input data.

You can perform an unlimited amount of FFT processes in the **Digital Signal Processing** window. ARM automatically saves each process. Each time an FFT is created, it is added to the list of outputs stored in memory. The **Record** drop down list displays each FFT process record.

Figure 5 - 5.
Record Drop Down List.

- To view previous FFT outputs, select an FFT output record from the **Record** drop down list.
- To remove an FFT output, select an FFT output record from the **Record** drop down list and click **Delete**.
- To add a note to each record as it is viewed, click the **Notes** button to display the **Enter notes** dialog.
- When you have finished your analysis, click **OK** to save all of the results.
- To exit the **Digital Signal Processing** window without saving any of the created records, click the **Close (X)** button at the top right, or press **Alt+F4.**

> ➢ Specify how to output processed data created as new records in **Program Options / Other.**

If you chose to save to a new data structure on the main window, this displays in the main window's left panel, with the first record highlighted.

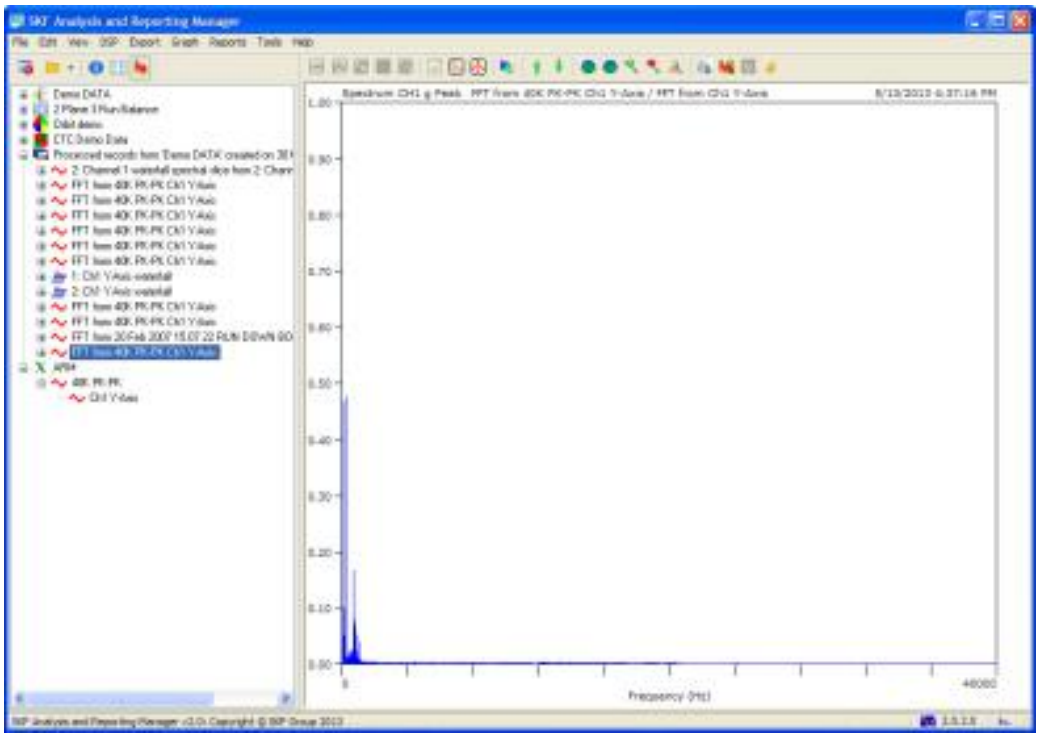

Figure 5 - 6.
Main Window.

If you chose to save output data to a new graph window, a new floating graph window displays.

Single Spectrum between Cursors

To display a single spectrum from a portion of the waveform:

- Select the **Single spectrum** option and check the **Use samples between cursors** checkbox. Zoom lines appear on the graph plot (designated by a separate color) indicating the start and end points (cursor positions) of the source data that will be used in the waveform portion of the analysis.

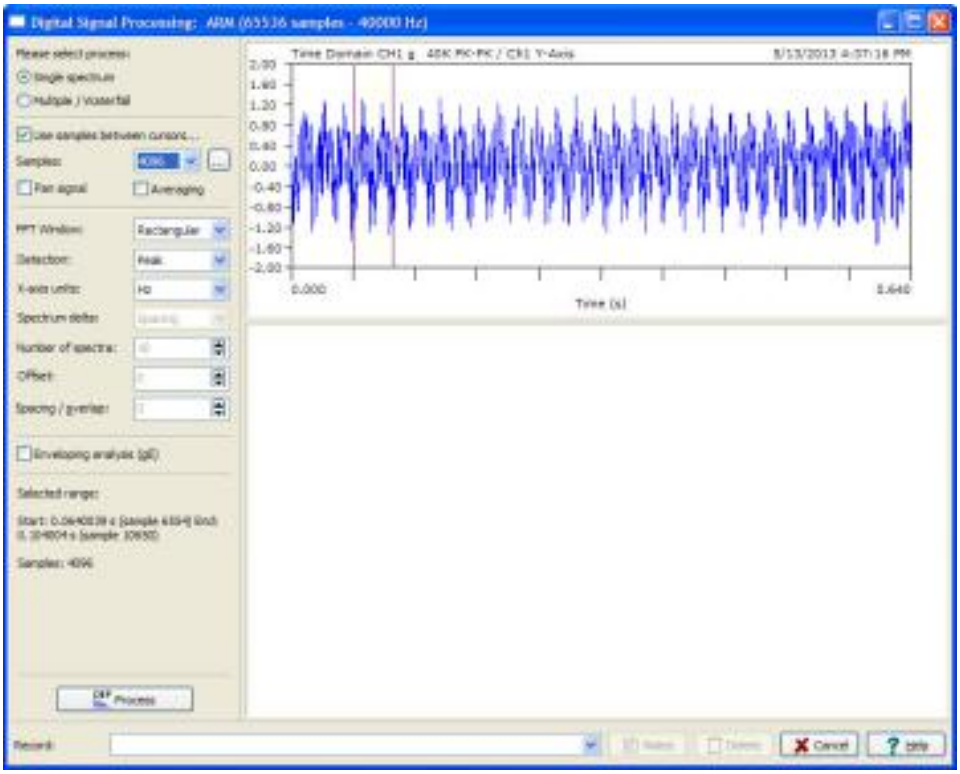

Figure 5 - 7.
Single Spectrum.

To adjust the source data range:

- Press and hold the **Ctrl** key and hover the mouse cursor over one of the start/end points. The cursor changes to a left-right arrow:

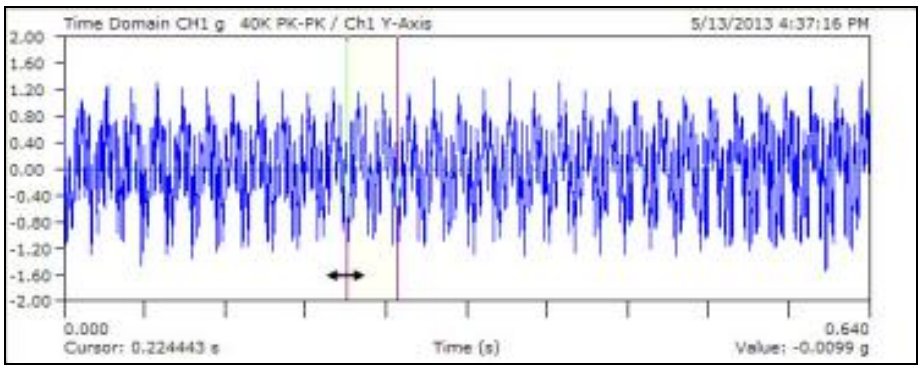

Figure 5 - 8.
Adjust the Source Data Range.

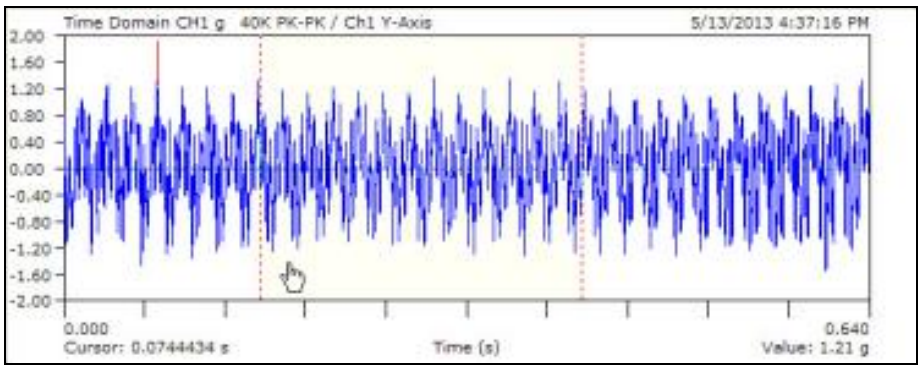

Figure 5 - 9.
Start/End Points to the Desired Location.

- Click and drag the start/end points to the desired location.

The number of lines selected for the FFT update in the **Samples** field in the left panel and the data updates in the informational area.

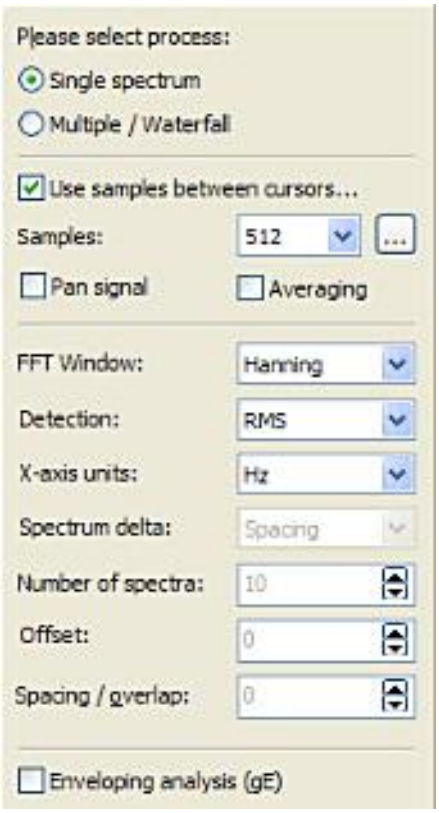

Figure 5 - 10.
Left Panel.

If the mouse cursor is between the start and end points, the pointer changes to a cross; click and drag to move the whole range, keeping the same width.

➢ You can only perform a FFT on a power of 2; the software will reduce the range to the nearest power of 2 below.

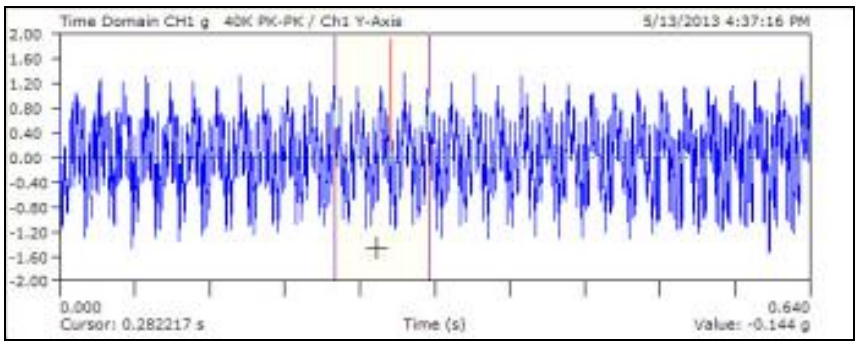

Figure 5 - 11.
Whole Range.

- To enter the cursor points manually, click the **Browse** button on the left panel next to the Samples field. The **Enter range** dialog displays.
- Enter the starting and ending values to determine the number of lines selected for the FFT.

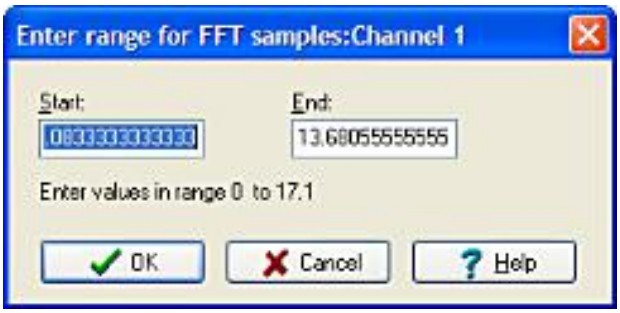

Figure 5 - 12.
Enter Range Dialog – Starting and Ending Value.

- Once you have specified the required range, specify the **FFT Window** filter, **Detection**, and **X-axis units**, and click **Process.** The output spectrum displays in the lower panel.

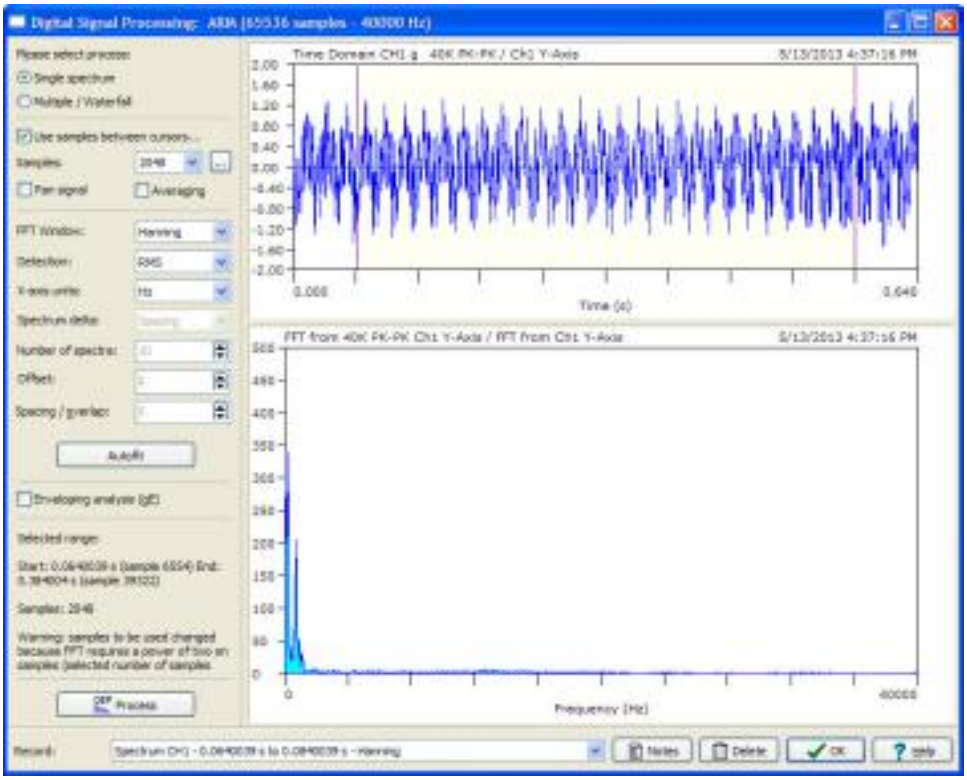

Figure 5 - 13.
Output Spectrum.

You can perform an unlimited amount of FFT processes in the **Digital Signal Processing** window. ARM automatically saves each process. Each time an FFT is created, it is added to the list of outputs stored in memory. The **Record** drop down list displays each FFT process record.

Multiple/Waterfall Plot

ARM can provide simple and complex processing of time waveform data into multiple records or waterfall plots. For multiple-channel recordings where one of the channels represents a trigger signal, the trigger can be used to derive time and rotation information suitable for creating speed based waterfall processing, opening up the way for complex spectral analysis including phase data.

To display a waterfall plot of spectra from the waveform:

- Select **Multiple / Waterfall** from the **Please select process** control. The fields below are enabled, allowing you to select the number of spectra to produce, the number of input **Samples** for each spectrum and the **Spacing / overlap** required, as well as the **FFT Window, X-axis units**, and **Detection**.

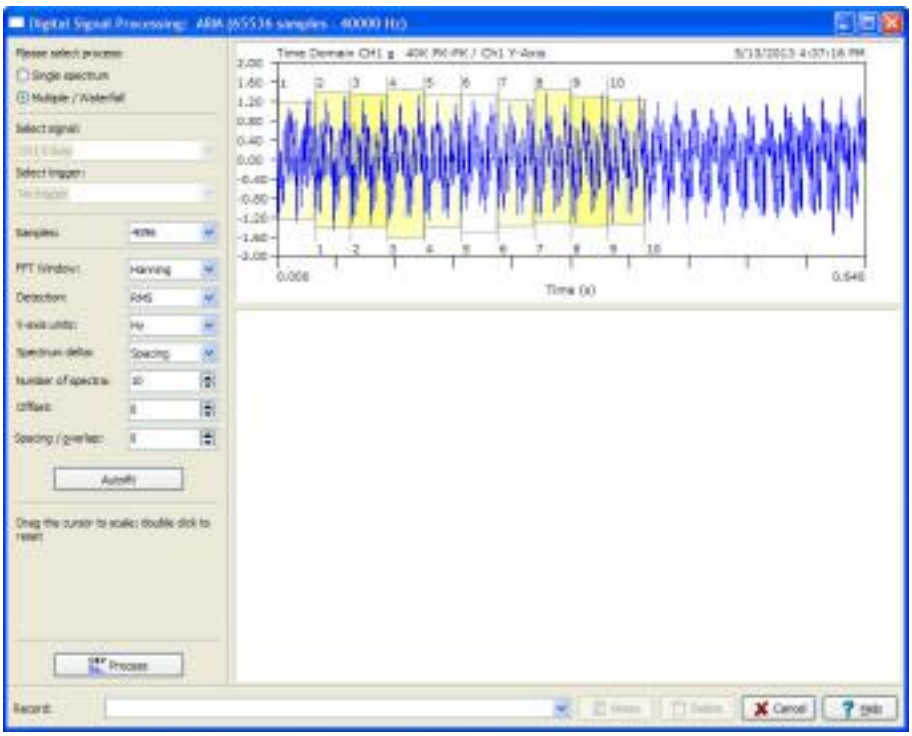

Figure 5 - 14.
Main Window.

Three methods are available for processing this data:

Even spacing – Specify the **Samples**, **Offset**, and **Number of spectra**.

Delta-time – Select the **Delta time** option from the **Spectrum delta** drop down list, and specify the Delta time (ms) value. ARM automatically calculates how many spectra to generate and the **Number of spectra** field automatically updates.

Delta-RPM – (recommended if you have a trigger input) Select the **Delta RPM** option from the **Spectrum delta** drop down list, and specify the Delta RPM value. ARM analyzes the trigger channel to calculate the sample zones used to generate the spectra. Speed and phase information is stored with each spectrum, allowing you to generate a proportional run up or coast down plot. The speed range of the data displays in the information panel and on the caption bar, and indicates whether it is a run up or a coast down.

- The **X-axis units** field includes an **Orders** option for the Delta RPM, allowing you to display an order normalized waterfall plot.

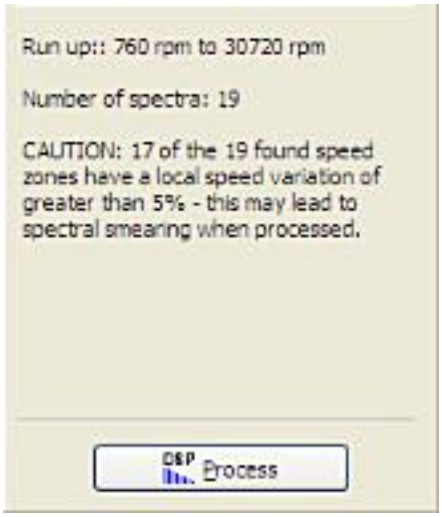

Figure 5 - 15.
Information/Parameters for DSP Processing.

The zones selected for the FFT samples display as numbered, dotted boxes on the waveform, showing how the samples distribute across the waveform, and the extent of the sample that will be included in the waterfall.

As you adjust the **Samples** and **Spacing/overlap** fields, the zones update and the spacing (in samples and seconds) between each spectrum displays in the information panel above the **Process** button.

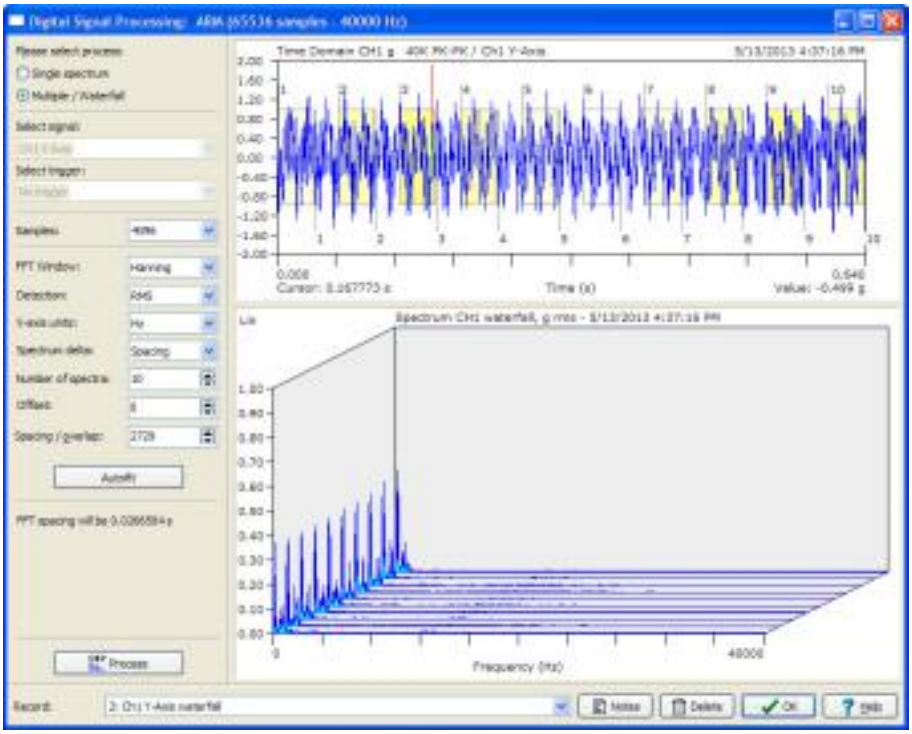

Figure 5 - 16.
Axis Range.

When you have a multiple-channel recording, and have selected the **Delta RPM** processing option, ARM performs a speed check on the generated zones and draws a zone in red if a speed variation greater than 5% is detected across the zone.

- Move your mouse cursor across a zone to display a summary for that zone in the information panel. The text is also in red to highlight the speed warning.
- Zoom in on the waveform to see how the zones are drawn and numbered.

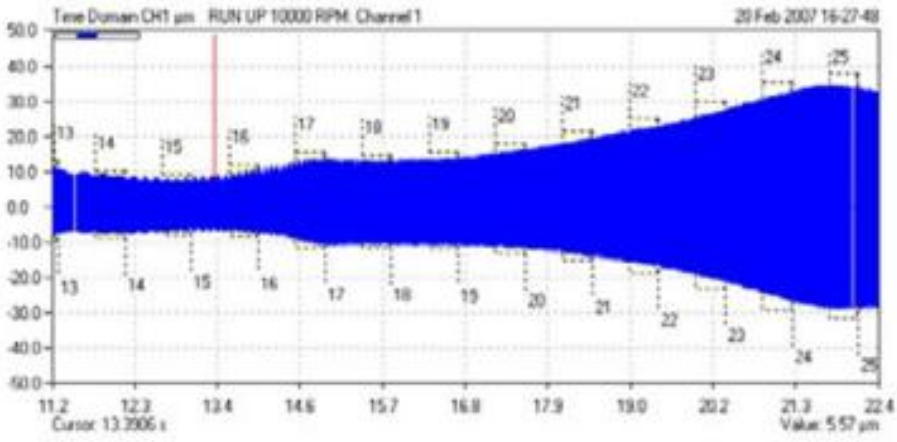

Figure 5 - 17.
Waveform.

Autofit

If you are processing the data with the **Spectrum Delta / Spacing** option, ARM automatically checks your settings. If they add to a sample length that is greater than what is available, a warning message displays when you click the **Process** button.

If a warning displays, you must reduce the **Samples**, **Number of spectra**, or the **Spacing**. You can do this manually by adjusting each field or you may use the **Autofit** feature to automatically calculate the spacing required.

The **Autofit** feature applies your selected sample length and number of spectra required to the number of samples in the waveform. It automatically calculates the spacing to fit the required sample zones along the entire extent of the sample, adjusting the spacing or overlap required.

> ➢ This option is not available for the **Delta time** and **Delta RPM** options, as the application automatically calculates the zones.

To apply the Autofit feature:

- Click the **Autofit** button. A **Confirm** dialog displays and prompts you to apply these settings.

Figure 5 - 18.
Confirm Dialog.

- Click **Yes.** The new zones display on the waveform.

Average Results

When enabled, the **Averaging** checkbox allows you to create a single, averaged spectrum from the waterfall. When you click **Process**, the required number of spectra is created, then averaged together to produce a single spectrum.

> ➢ This option is not available for the **Delta time** and **Delta RPM** options.

- Once you have specified the required values, click **Process**. The output waterfall displays in the lower panel.

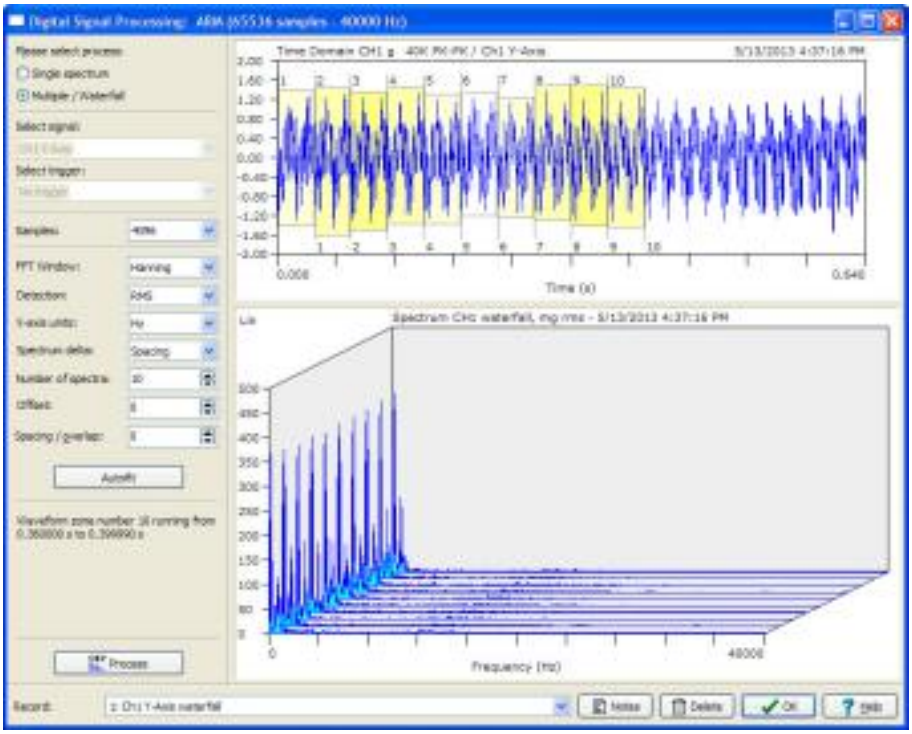

Figure 5 - 19.
Waterfall Display.

You can create unlimited waterfall plots in the **Digital Signal Processing** window. ARM automatically saves each process. Each time an FFT is created, it is added to the list of outputs stored in memory. The **Record** drop down list displays each FFT process record.

Cepstrum and Power Cepstrum Post-Processing

The DSP Module provides several features that allow you to post-process spectrum measurements into a Cepstrum, power Cepstrum, or power spectrum. These show repetitive patterns in the accentuated peaks to help understand the repetitive frequencies (frequency gaps between peaks) in the machinery.

A Cepstrum contains information about rate of change in the different spectrum bands. It has higher, more obvious peaks, which makes it easier for the analyst to identify, giving a better insight into the repetition of both signals.

Cepstrum was originally invented for characterizing the seismic echoes resulting from earthquakes and bomb explosions. It has also been used to determine the fundamental frequency of human speech and to analyze radar signal returns.

These post-processing options are accessible from the **DSP / Post Processing** menu. The selected option will display a check next to it in the menu.

Figure 5 - 20.
DSP / Post Processing Menu.

- A Cepstrum does not create an additional record. You can simply toggle between a spectrum and a Cepstrum.

Cepstrum - The result of taking the inverse Fourier transform of the logarithm of the spectrum of a signal. A Cepstrum converts the power spectrum values and converts them to decibels, then performs a FFT on the shape to produce another spectrum. With a Cepstrum, both negative and positive values display.

Power Cepstrum - The squared magnitude of the (inverse) Fourier transform of the logarithm of the squared magnitude of the Fourier transform of a signal. A power Cepstrum squares the Cepstrum values. In essence, it's a FFT of a FFT. Since squaring a value always results in a positive value, a power Cepstrum only displays positive values.

With a Cepstrum and power Cepstrum, units are measured in decibels (dB) and the x-axis units display in terms of time ("quefrency", not frequency). Quefrency is a time parameter that can be thought of as "delay time" or "periodic time" rather than absolute time.

Power spectrum - The squared values (amplitude) of a spectrum (squaring of every spectrum amplitude). When creating a power spectrum, the units modify to the original units and are squared (^{2}).

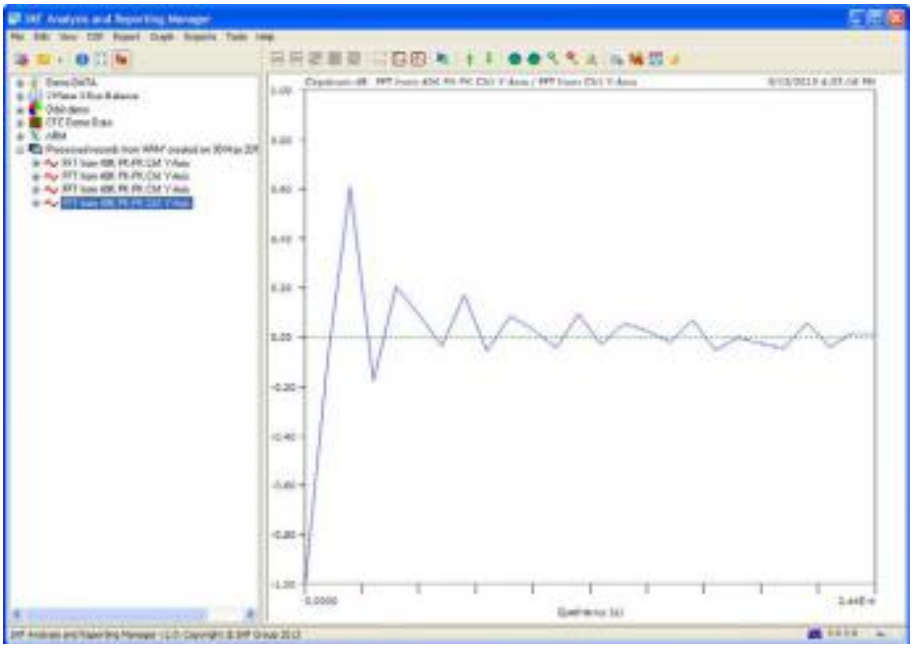

Figure 5 - 21.
Cepstrum Display.

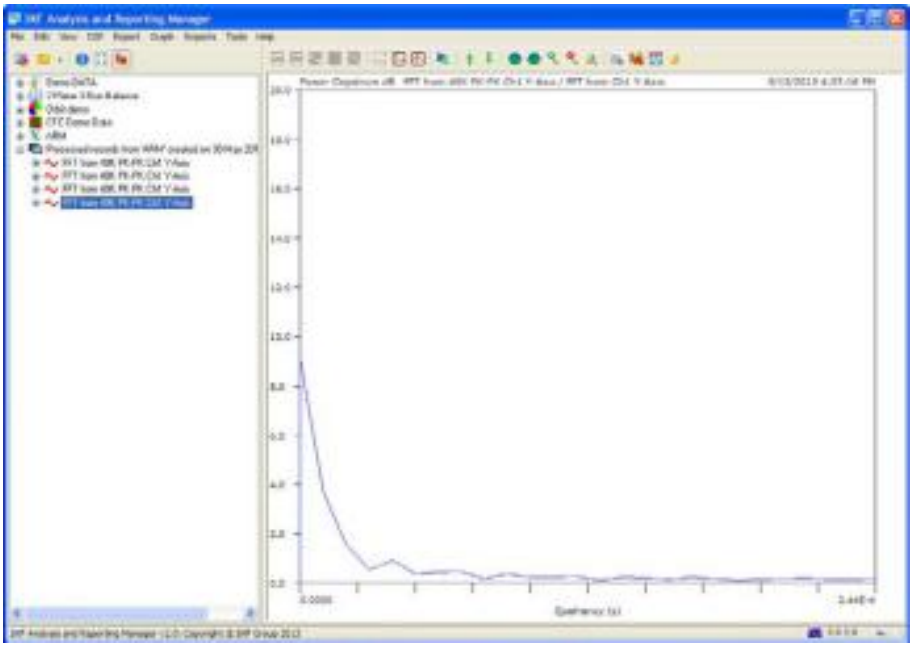

Figure 5 - 22.
Power Cepstrum Display.

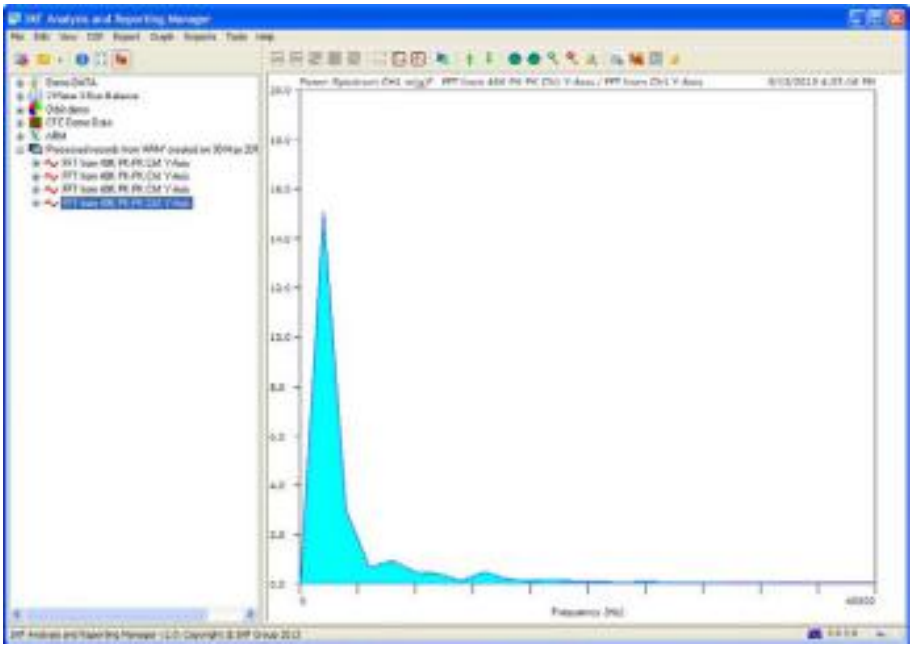

Figure 5 - 23.
Power Spectrum Display.

To post-process a spectrum into Cepstrum or power Cepstrum:

- On the left panel, select the spectrum record you wish to process.
- Click **DSP / Post Processing** and select an option. The display updates to show the data processed using the selected option.
    - ➢ The available options depend on the level of item selected in the left panel. The first level represents the entire data structure (one or more sets of data); the second level represents a single piece of data (or measurement), containing one or more channels of information; and the third level represents a single measurement channel.
- Depending on the data, you may need to amplify the range to see how the data has been transformed.
- To return to the original data (spectrum), select **Post Processing / None** from the **DSP** menu.

With two peaks, you can look for spacing between the peaks or if there is a repetition of those peaks along the Cepstrum.

To apply a difference cursor on the plot:

- Right-click the plot and select **Cursor / Difference cursor**. Two lines display showing the position of the cursors. The value in the bottom right of the window shows the difference in amplitude between the two points.
- If there are two peaks, you can see what the frequency relationship is between them. The bottom left of the plot shows the x-axis information - the two positions the cursors take and the interval in seconds and frequency relationship (frequency difference).

- To amplify the range, put the cursor over the graph and use the mouse wheel, or right-click the y- or x-axis for magnification options, scale units, etc., or use the keyboard controls or **Graph** menu to customize the plot.

DSP Toolbar

The DSP toolbar displays at the top of the ARM main window, below the main menu bar.

Figure 5 - 24.
DSP Toolbar.

This toolbar is fully configurable, like the others (reference the *Custom Toolbars* section later in this manual). The default state contains most of the commands you find under the DSP menu. Those commands that require a selection employ drop down list boxes from which you choose the value required; this value will also show on the caption for the control.

Quick FFT, gE, and Waterfall Functions

The **Quick FFT, Quick gE** and **Quick waterfall** functions allow you to process the selected waveform data straight into spectra without opening the **DSP Window**. If you choose this option for an entire data structure, all of the waveform data processes at once.

- The **Quick gE** option uses the gE settings from the DSP Window to process the data.

Use the **FFT Window** and **FFT Lines** controls to select the window filter and number of lines resolution of the resulting spectrum. Note that when choosing a subset of the source waveform this way, the samples are taken from the start of the waveform.

- Select **Entire record** from the **FFT Lines** control to process the entire record. Note that this will disable the **Quick waterfall** function.

Use the **WF Spectra** and **WF Spacing** controls to define the number of spectra to produce from the source and the spacing or overlap for each successive spectrum.

Use the **gE Band** controls to define the range (in Hz) to use for a quick enveloping analysis.

Waterfall Spacing

On the **Waterfall spacing** dialog, specify the number of sample lines used to separate or overlap the blocks of data used to create the spectra the next time you display a Quick Waterfall. For overlap, enter a negative value.

Waterfall Spectra

On the **Waterfall spectra** dialog, specify the number of spectra to create from the waveform the next time you display a Quick Waterfall.

Post Processing

The **Post Processing** option allows you to process the selected waveform data into a **Cepstrum**, **Power Cepstrum**, or **Power spectrum**.

- The **Cepstrum** option squares the values (amplitude) of the original spectrum, converts the values to decibels, and then performs a FFT on it.
- The **Power Cepstrum** option squares the values of the Cepstrum.
- The **Power spectrum** option squares the values (amplitude) of the original spectrum.
- The **None** option toggles the Cepstrum, power Cepstrum, or power spectrum back to the original spectrum (removes the post-processing).

6
Check-to-Conformance Module Support

Check-to-Conformance (CTC) data originates from the Check-to-Conformance module in the Microlog, and is used to assess machinery health in accordance with industrial standards (ISO, BS, API, etc.) or user defined standards. Vibration levels automatically compare with predefined limits and a pass or fail indication display. The results are stored in a Check-to-Conformance results file.

You can upload these files from the Microlog and display them in ARM. You can output the results table to a Microsoft Word document, and successive readings from the same template can be linked together to allow trending.

Check-to-Conformance Results Files

ARM can fully support the results files from the CTC module. These files (CCR files) may be loaded from the device or from disk; any associated data files (in CSV format) are loaded along with the CCR file and bound to the CTC results in the data stream file.

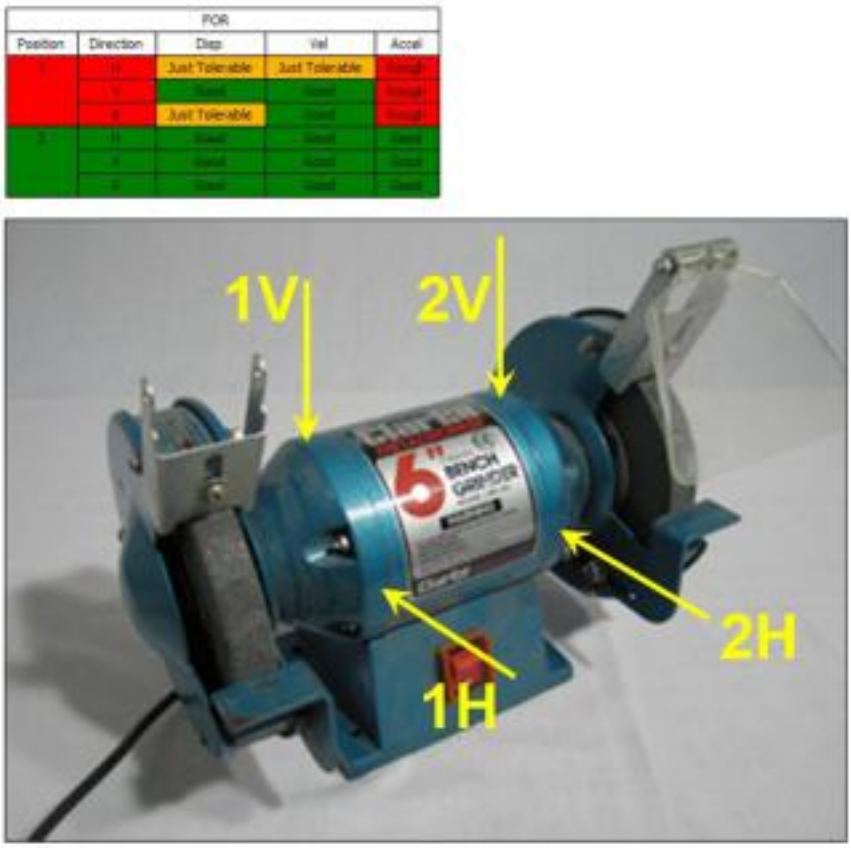

Figure 6 - 1.
Check-to-Conformance Report with Overview Picture.

ARM displays the same CTC report that shows on the Microlog's screen.

To display the CTC file's results:

- Select the **"root" node** of the data structure, and select the **View** menu's **Graph** option. The report displays in the right panel.
    - ➢ The program defaults to this page for all CCR files unless manually set to a different view.

Access various options governing display of this report through a context menu on the report or from the **Graph / Check-to-conformance reports** menu.

The separate results files, in CSV format, are also loaded and can be displayed as a multiple or waterfall plot.

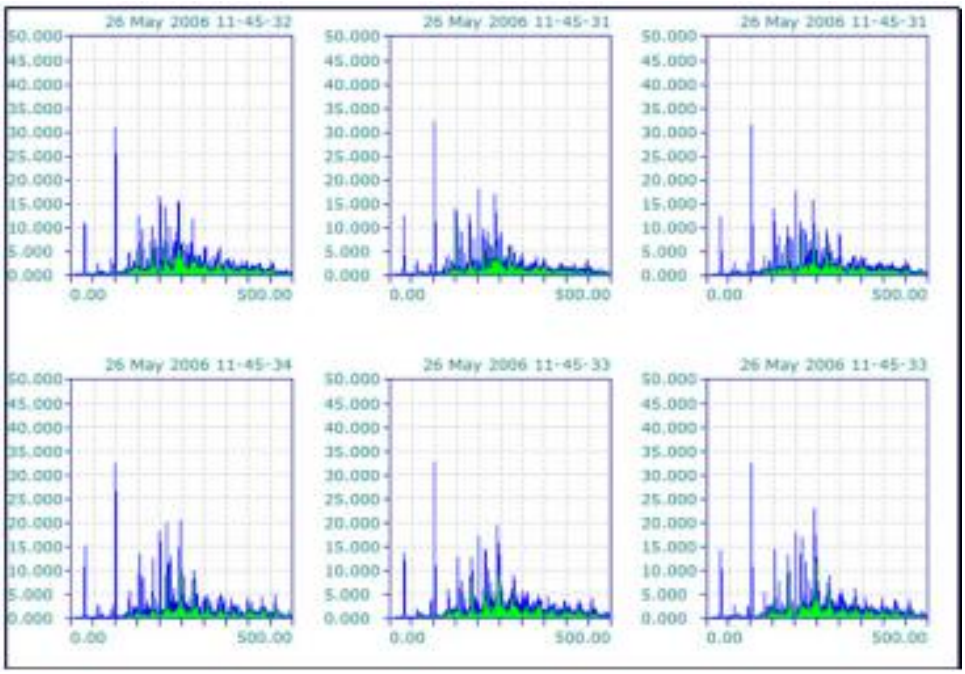

Figure 6 - 2.
Separate CTC Result Files.

To customize the appearance of this graphic:

- Right-click to display a pop-up menu and select the options you wish to include in the graphic.

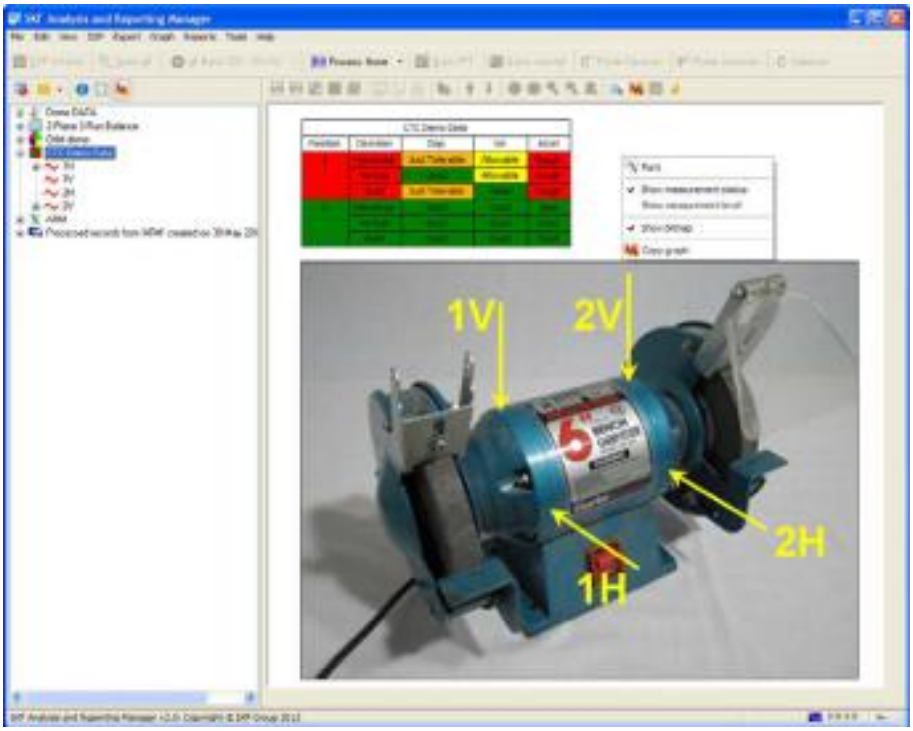

Figure 6 - 3.
Options for the Graphic Display.

Since all data (the CTC results and the individual spectral recordings) is bound together in the data stream file, this file may be used as a permanent record of each measurement.

CTC Word Reports: Special Rules

Special rules govern how CTC results are output to Microsoft Word reports.

CTC reports contain the CTC report and a set of spectral readings.

The CTC report provides three output items to the document: the results table, the machine graphic, and the multiple plot of the CSV results. Alternatively, you can ignore the CTC results and simply output the individual spectral records like a standard report.

For CTC reports using a Word template, three bookmark properties are available for the three output items. In addition, the standard report template items can be selected, but only operate on the first record taken, including its graph plot.

For non-template reports, the three CTC items are output to a plain table and two stand alone images. If you select any standard report elements, they are output to the single document, in sequence at the end, one per spectrum in the CTC.

You can output CTC results using the **Word Reporting** function in the software, and include the table, machine graph, and multiple data plot as required.

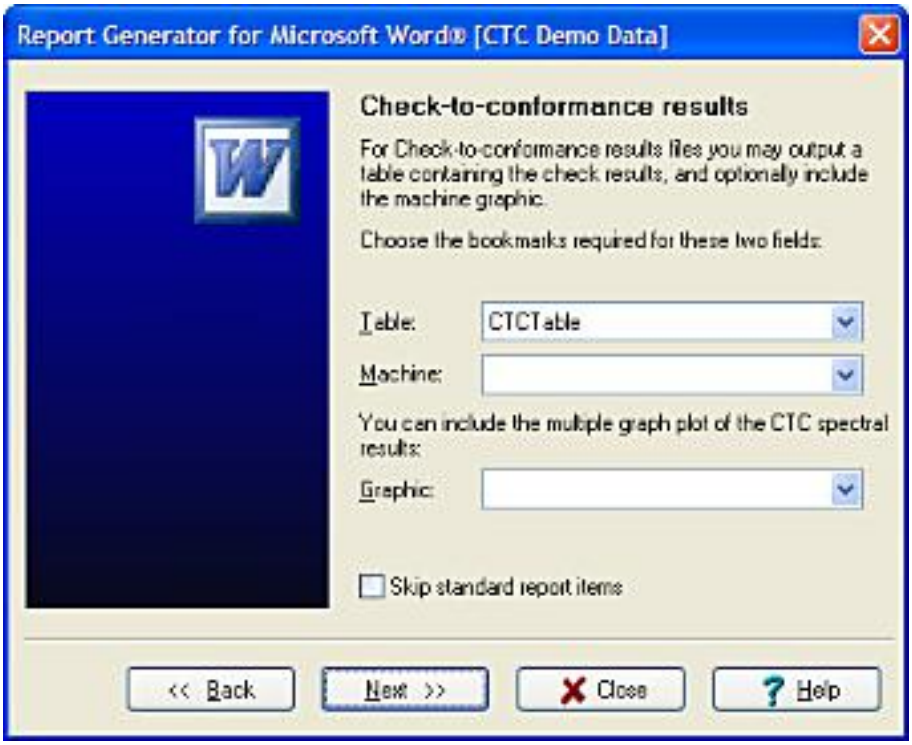

Figure 6 - 4.
Word Reporting Function.

Reference the *Report Generator for Microsoft Word* section for more details about generating CTC reports.

CTC Setup Generator and File Manager

ARM's **File Manager** window allows you to manage CTC set up files, used for gathering CTC data. You can create and edit these files using a Template Generator utility that is bundled with ARM.

To view the File Manager window:

- Click **Tools** and choose **CTC File Manager**.

The **File Manager** window lists all of the CTC set up files located in your local data directory. If a suitable mobile device is attached to your computer, its CTC set up files also display.

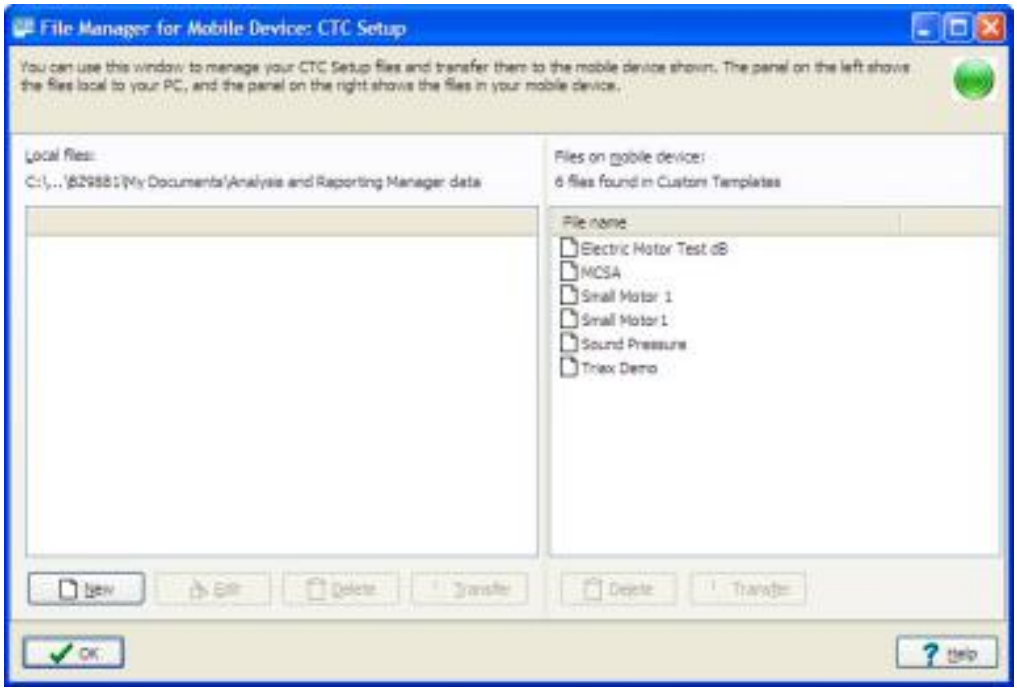

Figure 6 - 5.
File Manager Window.

The **Local files** panel shows all of the CTC set up files located in your current CTC Setup files directory. You can sort each file by its name, size, and date by clicking on the column headers.

Below this list box are a number of controls that allow you to manage these files.

New – Click to create a new set up file.

Edit – Click to edit an existing file

Both of these options utilize the **Template Generator** utility:

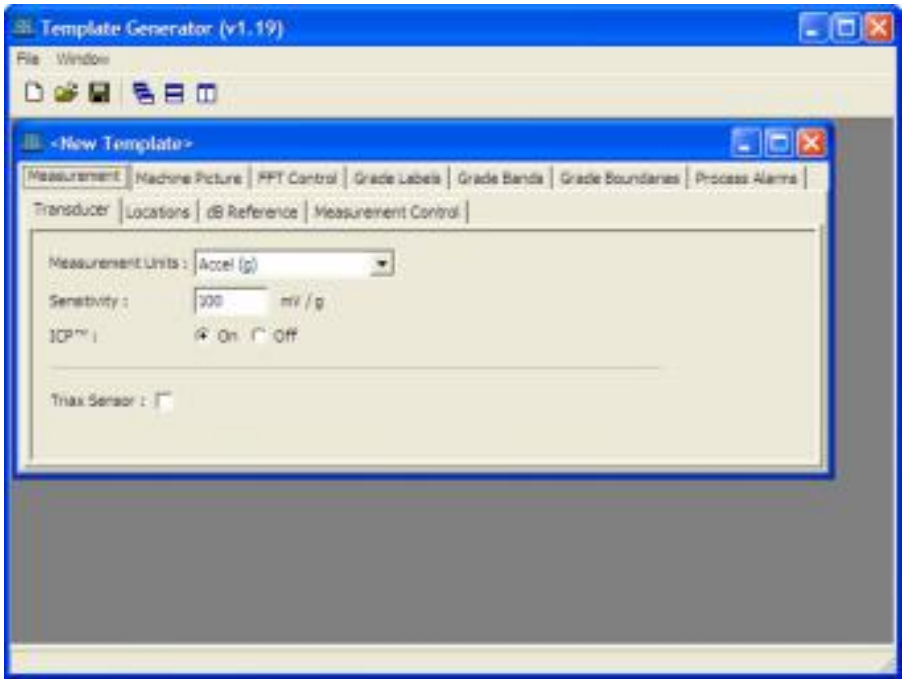

Figure 6 - 6.
Template Generator Utility.

Delete – Click to delete (to the recycle bin) any selected files.

Transfer – Click to copy the selected files to the mobile device.

The **Files on mobile device** panel shows all of the CTC set up files located in the appropriate directory on your mobile device. Below the list box are a number of controls that allow you to manage these files.

Delete – Click to delete any selected files.

Transfer – Click to copy the selected files from the mobile device back to your computer.

- File transfers in either direction will overwrite any file that already exists in the destination, without any warning.

Tab Overview

Measurement – Specifies the vibration measurement sensor type and sensor location settings.

Machine Picture – Displays a user specified picture or diagram of the test machine showing sensor placement locations.

FFT Control – Allows FFT parameters to be changed.

Grade Labels – Specifies the number of test grades (alarms) and the label for each.

Grade Bands – Specifies the number of test measurements (bands) for each sensor location, defines the specified measurement types and measurement frequency range.

Grade Boundaries – Specifies grade level settings (alarm levels) for each test grade at each measurement location.

Process Alarms – Specifies the number of alarms and the label for each.

Measurement Tab

Measurement tab settings specify the type of vibration sensor used, the number of test measurement locations, and the sensor placement orientation(s) for each measurement location. Note that the type of sensor specified (accel, vel, disp, etc.) determines the type of FFT spectrum collected (acceleration, velocity, displacement, etc.).

Transducer Sub-Tab

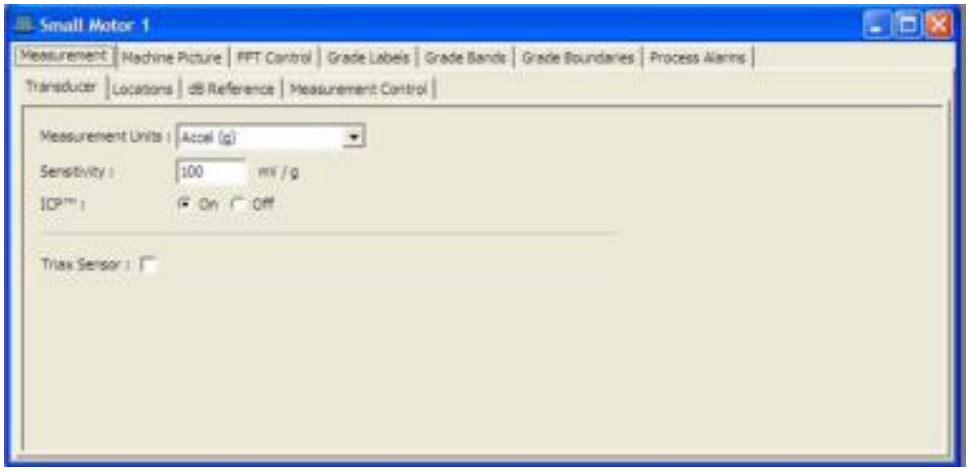

Figure 6 - 7.
Measurement – Transducer Tab.

Measurement Units – Select the desired measurement units from the drop down list. Note that you may use any derived (integrated) measurement units to specify individual measurement bands.

Sensitivity – Use the alphanumeric keypad to enter transducer sensitivity in millivolts (mv) per Engineering Unit (EU).

ICP – Specify if ICP powering should be applied to transducer (**On**) or not (**Off)**. Note that when selecting the measurement units from the drop down list, the normal transducer ICP powering is deduced and applied. This default behavior should be overridden, if required.

Triax Sensor – Check this box if using a triaxial sensor. Note that checking this box enables further parameters to be entered. Two additional **Sensitivity** entry boxes appear, totaling three, one for each input channel. Also note that checking the **Triax Sensor** box disables custom directions under the **Location** sub-tab.

Locations Sub-Tab

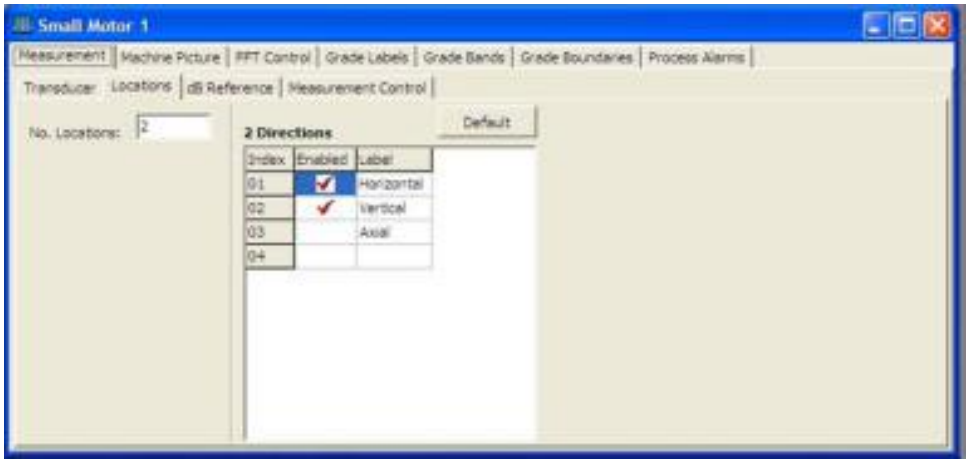

Figure 6 - 8.
Measurement – Locations Tab.

No. Locations – Specifies the number of measurement locations on the tested machine. Typically, each bearing is a test location.

Directions – Default options are **Horizontal**, **Vertical**, and **Axial**. This specifies at which sensor orientation(s) to collect data for each measurement location. Create up to 32 custom directions by simply entering text in the **Labels** column. Use the drop down by clicking on an entry in the **Enabled** column to enable, disable, or delete a direction.

If **Triax Sensor** (on the **Measurement – Transducer** tab) has been enabled, then directions cannot be named. Instead, Horizontal, Vertical, and Axial readings will be taken for each location.

dB Reference Sub-Tab

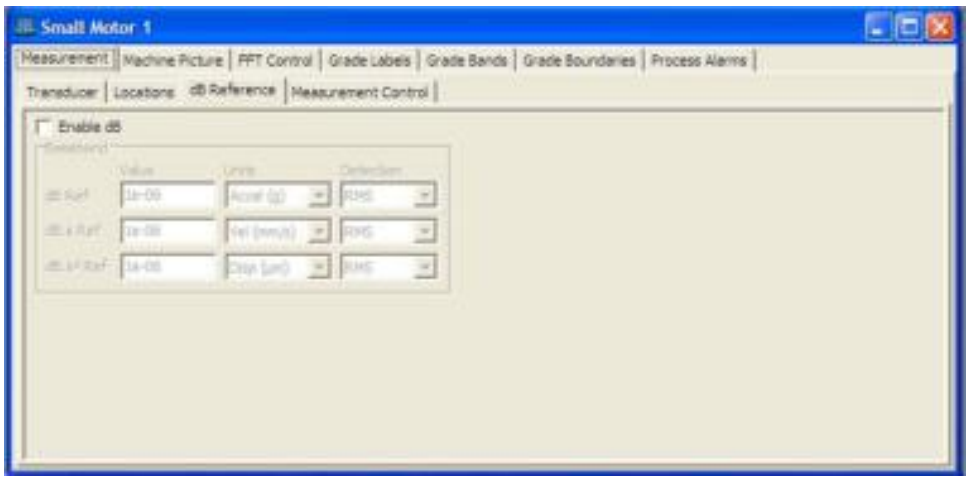

Figure 6 - 9.
Measurement – dB Reference Tab.

Enable dB – Enable if you are using decibels to measure vibration. When enabled, the **Baseband** area becomes editable. Enter your 0 dB reference value, measurement units, and detection type for Acceleration, Velocity, and Displacement measurements.

Measurement Control Sub-Tab

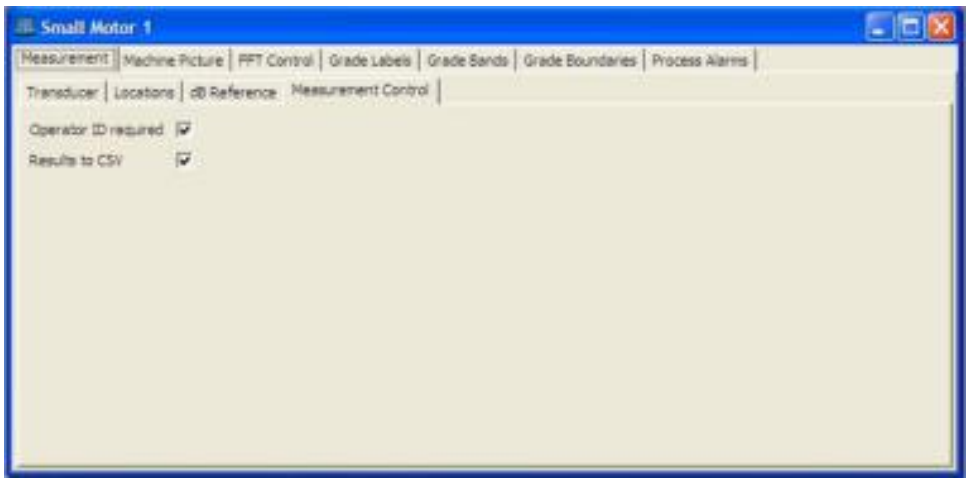

Figure 6 - 10.
Measurement – Measurement Control Tab.

Operator ID required – Enable if entering a unique operator ID is required before taking measurements. This allows you to associate a set of measurement results with a specific operator.

Results to CSV – Enable to save a results report in CSV format along with the default report (in CCR format). You can view the CSV report using Excel after uploading to the PC.

Machine Picture Tab

The **Machine Picture** tab allows you to specify a bitmap graphic (photo or diagram) of the machinery type being tested. The graphic is user defined and typically shows the test measurement locations on the machine. The specified picture transfers to the instrument with the test template and may be displayed for reference during testing.

The specified graphic must be in bitmap format. Recommended graphic size is 240 x 180 pixels at 72 DPI.

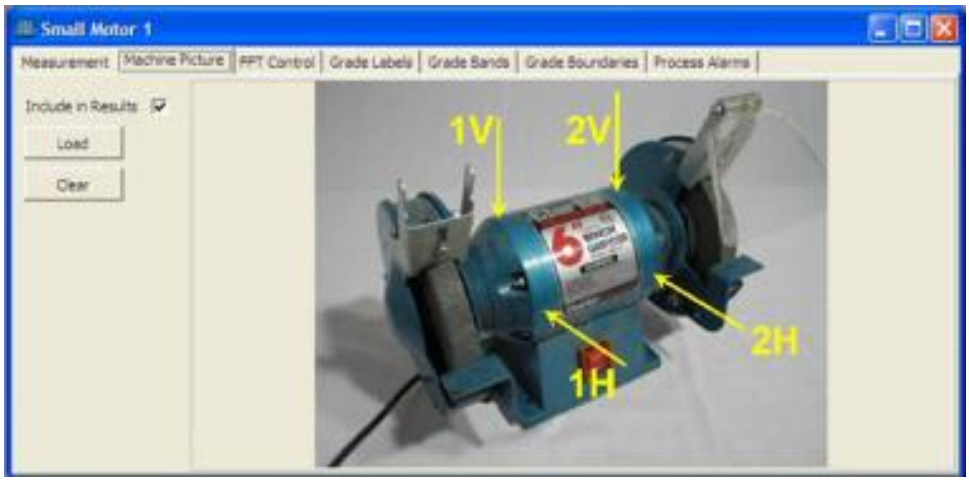

Figure 6 - 11.
Example of a Specified Machine Picture.

- Use the **Load** button to specify the test template's machinery graphic.
- Use the **Clear** button to remove any picture from the current setup.

By default, the picture saves along with the results in the .CCR file. Uncheck the **Include in Results** box if the picture is not to be included in the results file. If left checked, this can cause the instrument to run out of space relatively quickly after only a few results have been saved (depending on the picture size).

FFT Control Tab

FFT Control tab settings specify the FFT acquisition parameters.

Normal (Baseband) Sub-Tab

Figure 6 - 12.
FFT Control – Normal (Baseband) Tab.

FFT Lines – Select the number of lines to use for FFT from the drop down list.

Overlap % – Specify the percentage overlap to apply between acquired FFT blocks, when the number of averages is greater than one.

Num. Averages – Specify the number of FFT blocks to use when calculating an averaged FFT.

Average Type – Specify the type of spectral averaging to use:

RMS – Uses RMS averaging.

Peak-Hold – Not a true averaging type, but allows the spectral peak values to be extracted across the acquired number of FFTs.

Window Type – Specify the FFT window to apply.

Min. Freq. Range – Specify the minimum frequency range to apply to all measurements. By default, the instrument searches across all defined measurement bands (see "Grade Bands" setup) and finds the maximum frequency used. This, in effect, defines the required frequency range. However, if the measurement grade bands of interest are at the low frequency end, measurement times can become excessive. To combat this, the user may use this parameter to improve measurement acquisition times. (The status area at the bottom of the **FFT Control** tab gives an estimate of the measurement acquisition time.)

Save Options Sub-Tab

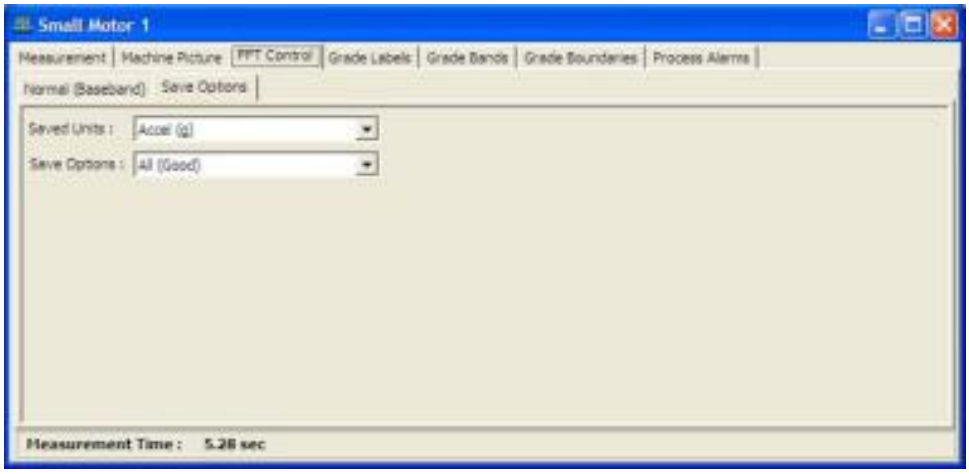

Figure 6 - 13.
FFT Control – Save Options Tab.

Saved Units – When saving spectra to CSV, this selects the desired FFT measurement units from the drop down list. This can be the measurement units as specified on the **Measurement** tab or any derived (integrated) units.

Save Options – Use this drop down list to specify when to save spectra to CSV. The drop down list contains the list of grades, as specified on the **Grade Labels** tab, and effectively specifies which grade (and above) will cause the FFT to be saved to CSV. For example, if grades with labels "A" through "D" have been defined with "A" being the lowest (green) and "D" the highest (red), then setting this option to "C" will cause the instrument to only save FFTs if any of the defined grade bands have vibration levels falling in the "C" or "D" grades. The special case option of "None" prevents any FFTs being saved under any circumstances.

Grade Labels Tab

Specify the number of test grades (i.e., vibration levels / alarm levels) for conformance testing, and the label for each grade.

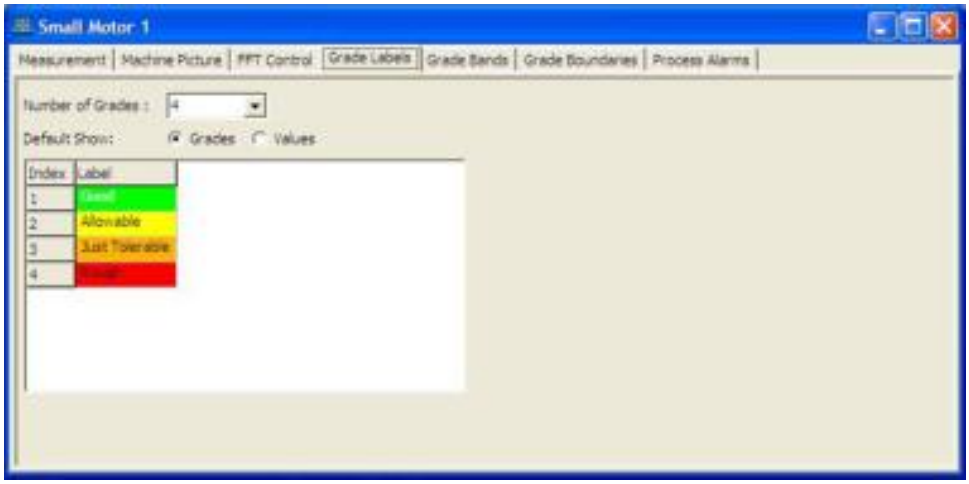

Figure 6 - 14.
Grade Labels Tab.

Number of Grades – Specify how many test grades to use to rate measurement results (up to eight). Below this field, colored bars automatically display for the specified number of test grades. Colors are automatically set.

Test grades apply to all of the test template's measurements. The **Grade Boundaries** tab specifies individual test grade settings (vibration level setpoints).

Default Show – Select the default view on the instrument. "Grades" will show the grade labels by default in the results on the instrument, whereas "Values" will cause vibration levels to be shown.

Grade Labels – Click a colored bar to change it to a text entry field. Examples of grade labels are: Pass/Fail, Good/OK/Bad, Poor/Acceptable/Good, etc. It is good practice to keep these labels short since they display on the instrument, which has limited screen real estate.

Grade Bands Tab

Grade Bands settings determine the number and setup of the overall vibration measurements.

For example, an acceleration spectrum is collected when using an accelerometer sensor. **Grade Bands** settings specify how the acceleration spectrum is measured to provide an overall vibration reading(s) that is compared to grade levels on the instrument (i.e., what frequency range is measured, what detection type is used, is the spectrum integrated into other vibration spectra, and if so, what are their overall vibration measurement settings).

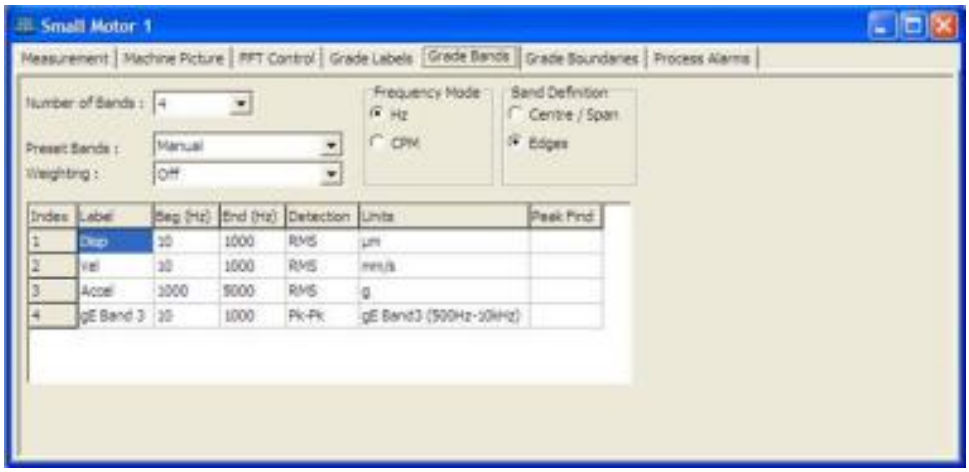

Figure 6 - 15.
Grade Bands Tab.

Number of Bands – Specify up to 64 overall vibration measurements (bands) to measure from the captured spectrum (typically only one or two for most conformance tests). A table below this field automatically displays a setup row for each band.

All measurements (bands) are simultaneously calculated and compared to test grade levels at each sensor location/orientation.

Preset Bands – This drop down list allows preset octave bands to be set up automatically.

Manual – Band frequency extent to be entered by hand.

1/1 Octave – Automatically sets up 11 bands between 16 Hz and 16k Hz using octave spacing.

1/3 Octave – High – Automatically sets up 31 bands between 20 Hz and 20 kHz using 1/3 octave spacing.

1/3 Octave – Mid – Automatically sets up 31 bands between 10 Hz and 10 kHz using 1/3 octave spacing.

1/3 Octave – Low – Automatically sets up 31 bands between 5 Hz and 5 kHz using 1/3 octave spacing.

If this entry is set to non-manual, you cannot edit band extents.

Having created octave or third-octave bands, you can manually edit the bands by setting **Preset Bands** back to **Manual**.

Weighting – From the drop down list, select the type of spectral weighting to apply.

Frequency Mode – Use this to select the preferred frequency units, either **Hz** or **CPM**. Note that this is a setup generator display option only and is not stored in the setup.

Band Definition – Use this to select how band frequencies display, either **Centre/Span** or **Edges**. Note that this is a setup generator display option only and is not stored in the setup.

Label – Click the cell and enter a descriptive label that indicates the measurement type for each band. Note that the band's **Units** setting determines the measurement type.

Beg Freq / Center – Enter the frequency band's beginning/center frequency in Hz/CPM (depending on **Frequency Mode** and **Band Definition**). Together, the beginning/center and end/span frequency settings define the frequency band being measured.

End Freq / Span – Enter the frequency band's end/span frequency in Hz/CPM.

Detection – The overall vibration reading for each band is calculated using the specified detection method (RMS, Peak-to-Peak, 0-Peak, or AVG).

Units – Derives the overall vibration measurement type and units. For example, if an accelerometer sensor is used, and **Units** is set to **ips**, then the captured acceleration spectrum is integrated to a velocity spectrum whose overall vibration in the specified frequency band is measured accordingly.

Peak Find – Click on this cell to enable/disable the "peak-find" functionality. When enabled, the instrument will use the peak vibration level in the band instead of the overall vibration level.

Grade Boundaries Tab

The **Grade Boundaries** settings specify grade levels (i.e., vibration limits or alarm levels) for each test grade at each measurement location/orientation.

Figure 6 - 16.
Grade Boundaries Tab.

Location – Grade level settings may be unique to each sensor location/orientation. Use arrow buttons to specify the sensor location whose grade levels you are specifying. The table displays settings for the specified location.

Orientation Tabs – Options are the labels specified on the **Measurement - Locations** tab. Select the sensor orientation tab whose grade levels you are specifying. The table displays settings for the selected orientation.

Grade Level Table – For the specified sensor location/orientation, displays grade level settings for each measurement band's grade ratings. Click the cell whose setting you wish to modify and enter the new setting.

To facilitate quick setup, right-clicking on the table provides options for copying the selected grade level setting to other measurements, locations, or orientations.

To select a number of cells, click on a start cell and then use the **Shift** key in conjunction with the arrow keys to make the selection, which will be shaded blue.

Process Alarms Tab

The **Process Alarms** tab specifies the number of process measurement (alarms) and the label for each. It allows the user to input manual entries such as pressures, temperature, RPM, and voltage.

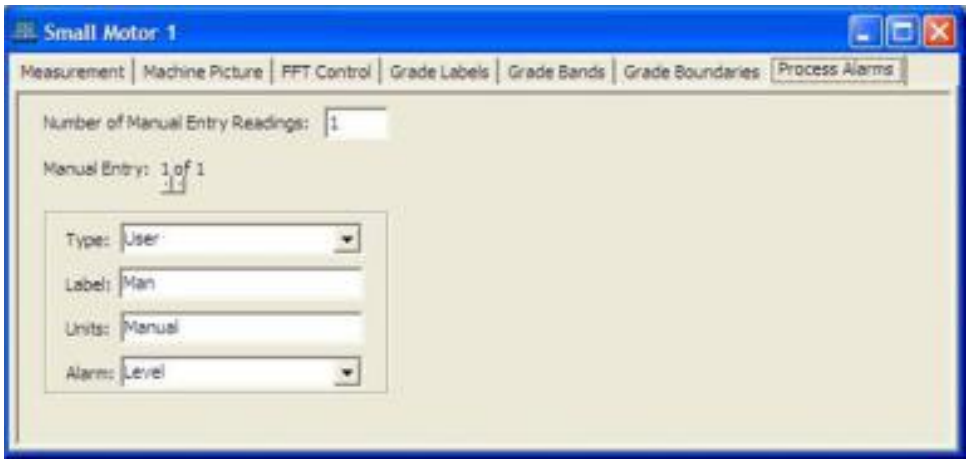

Figure 6 - 17.
Process Alarms Tab.

Number of Manual Entry Readings – Enter the number of process alarm entries.

Manual Entry – Click the scroll buttons to move to the next process alarm entry.

Type – Select the type of alarm: user defined or RPM.

Label – Enter text for the process alarm label.

Units – Enter the process alarm units.

Alarm – Select the alarm type as **Level**, **In-window**, or **Out-of-window**.

How to Save "Test Template" Settings

Test Template settings are saved to the host computer's hard drive and then transferred (by hand using ActiveSync) to the instrument.

After completing a new test template's setup, or after modifying the settings of an existing test template, select the **File** menu's **Save / Save As** option (or click the toolbar's **Save** button) to display the **Save As** dialog.

Using a descriptive filename, save the Test Template to an appropriate folder on your hard drive. The file is issued a .ccs filename extension.

Trending of CTC Data

ARM allows you to trend your CTC results data by selecting two or more results files and combining the values from their band levels into a series of trend plots.

ARM makes it easy for you to manage this information by moving the selected results data stream files into a custom directory from which the trend is constructed. A name is given to this directory (initially taken from the name under which you stored your CTC results) which you can choose; and files may be moved out of this directory and back to the main data directory if no longer needed for the trend.

To begin constructing a trend:

- Open one of the CTC results sets you wish to use (it doesn't matter in what order you add these files).
- Select the **Add to CTC Trend** option from the **File** menu. The **Save to CTC trend directory** window displays, allowing you select the destination and edit any existing trend folders:

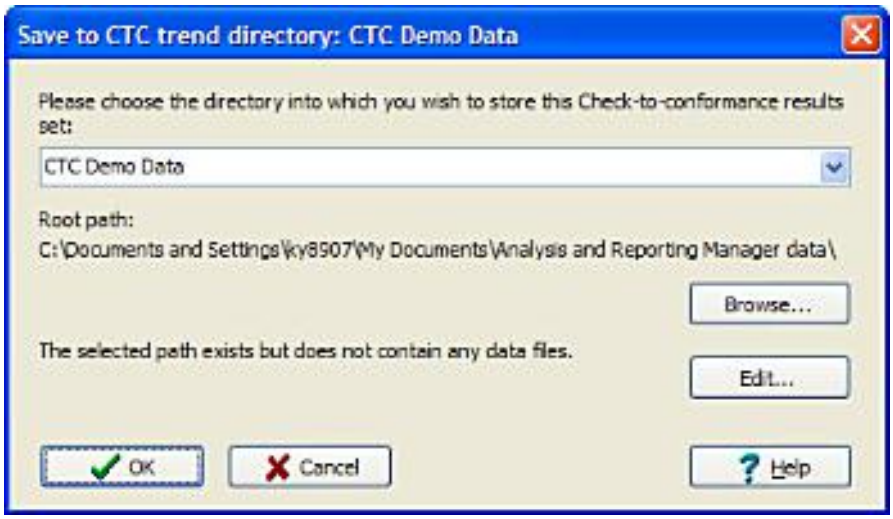

Figure 6 - 18.
Save to CTC Trend Directory Window.

Once there are two or more suitable results sets in the trend directory, ARM will construct and display the CTC trend.

- Repeat the steps above to add any other results sets to the trend.
    - ➢ As you add each result set, ARM compares the CTC set up in the new file to that used in the trend and will not add the new file if the setup is not the same.

When trends are constructed, they are automatically stored in a data stream file using the name of the trend directory, but including "CTC Trend" in the name to help identification. A trend consists of one record containing one trace for each measurement in the CTC setup and can be viewed just like any other ARM data set, such as a multiple plot:

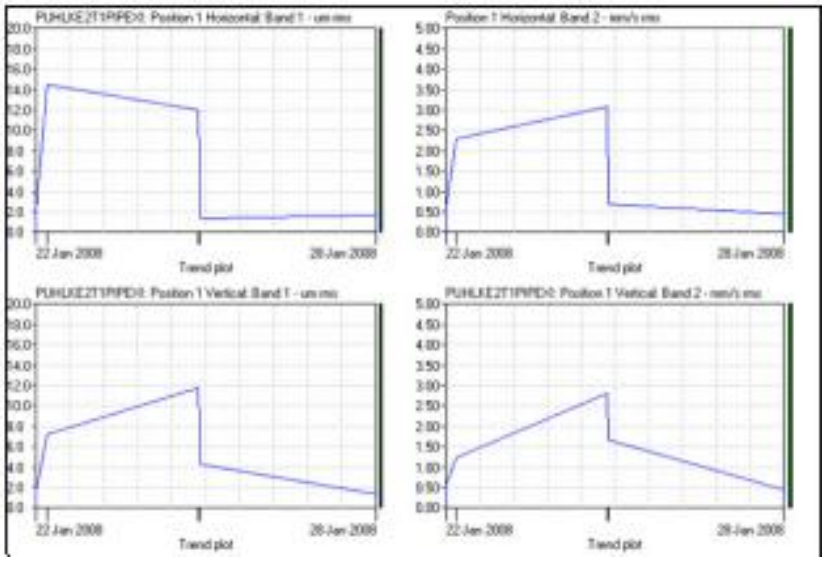

Figure 6 - 19.
CTC Trend.

Or you can view individual trends:

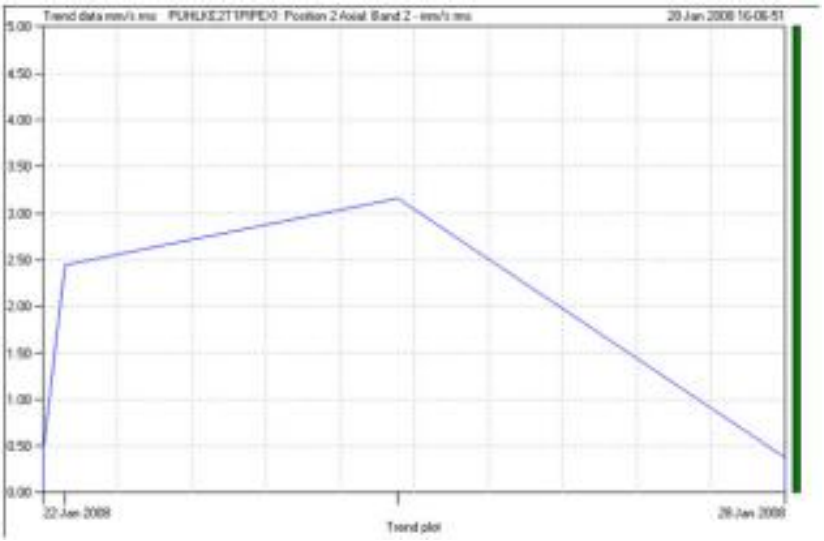

Figure 6 - 20.
Individual Trend.

A colored band is drawn to the right of the plot to show the band grade label value of the last reading – this is the color used to draw the value in the CTC table.

If you have an existing data stream file open that was constructed from a trend directory and have added new files to this directory, you can update your display in a single step by clicking the **File** menu's **Update CTC trend** option.

- To view the latest results from a trend directory directly, click the **File** menu's **Display CTC trend** option. The **Choose trend set** dialog displays, allowing you to choose and edit any existing trend directories:

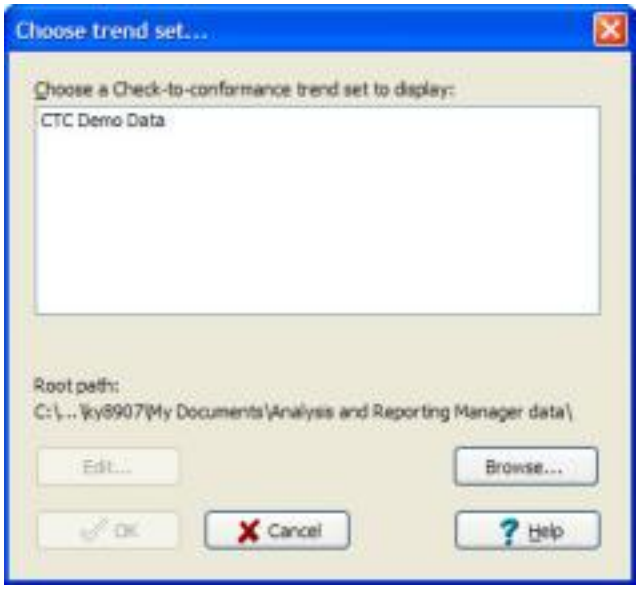

Figure 6 - 21.
Choose Trend Set Dialog.

- Click **Browse** to display trend sets located in another directory. You can edit any existing trend set by selecting it here and clicking the **Edit** button. This displays in the **Edit trend** dialog.

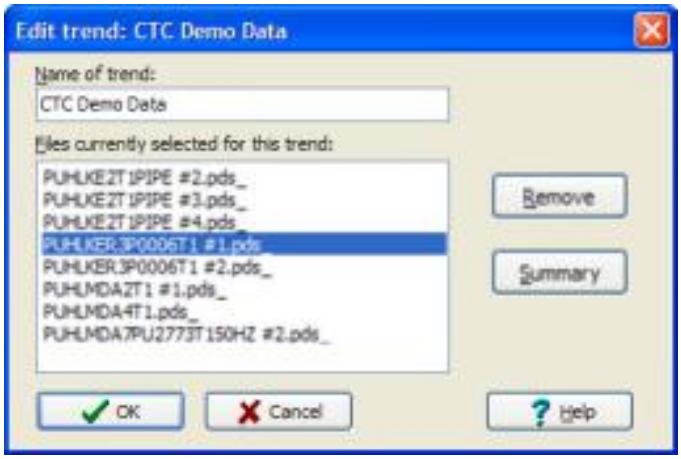

Figure 6 - 22.
Edit Trend Dialog.

The **Edit Trend** dialog allows you to change the name of the trend and remove any results files back to the main data directory, thus removing them from the trend.

To change the name, simply edit the text in the **Name of trend** control; upon closing this dialog, ARM renames the trend folder using this name. Whenever a trend is generated from this folder, the new name is used as the trend name.

The **Files currently selected for this trend** list box displays the names of the files currently located in the trend directory. When you select one of these files, two buttons become available:

Remove - Allows you to remove the selected file from the trend.

Summary - Displays a summary of the contents of the file.

- If you remove a file from the trend and a file exists with the same name in the data directory, you are prompted to either overwrite the existing file or recycle the file being removed from the trend.

7
Reports

Reporting Expert

Reporting Expert Wizard

ARM's **Reporting Expert** wizard generates text-based reports on your data. Each report includes various reporting items and general information about each record. Reports apply to the selected data structure on the main window and every record within the data structure.

To launch the Reporting Expert wizard:

- Select the **Reports** menu's **Text Reporting Expert** option. The **Reporting Expert** wizard displays.

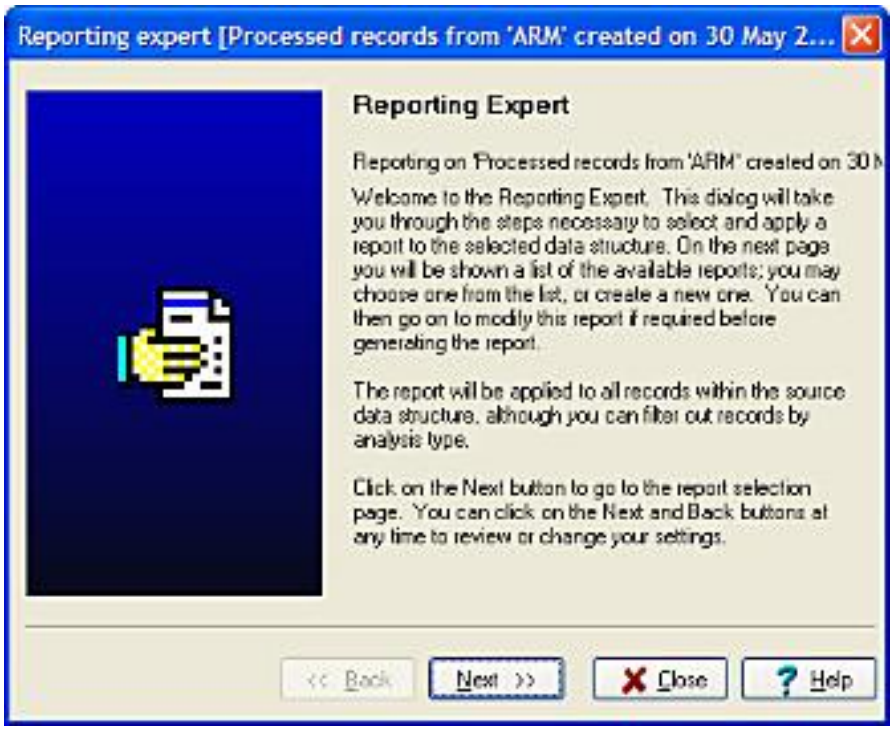

Figure 7 - 1.
Reporting Expert Wizard.

- Click **Next**. The **Select Report** page displays.

Reporting Expert: Select Report

On the **Select report** page, select the report to apply to the selected data structure (shown in the window caption). You may also create new reports and delete existing reports on this page.

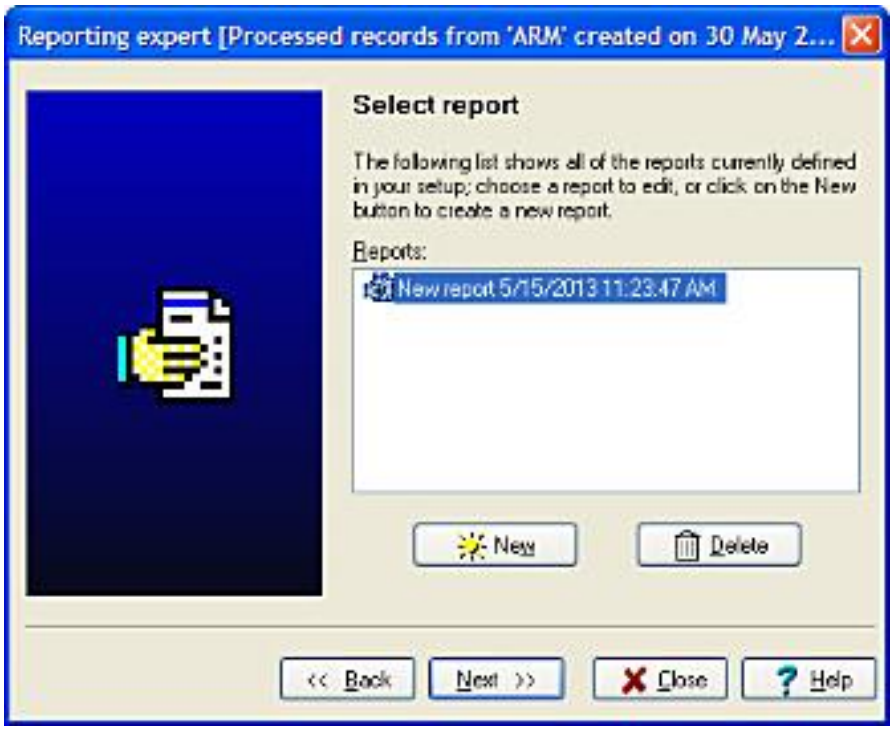

Figure 7 - 2.
Select Report Page.

The **Reports** list box displays all defined reports.

To delete a report:

- Select a report from the **Reports** list.
- Click **Delete.**

To create a new report:

- Click the **New** button. A new report displays in the **Reports** list.

To apply a report to the selected data structure:

- Select a report from the **Reports** list
- Click **Next**. The **Definition of Report** page displays.

Reporting Expert: Definition of Report

On the **Definition of report** page, enter the report name and choose general record information items to include in the report for each record.

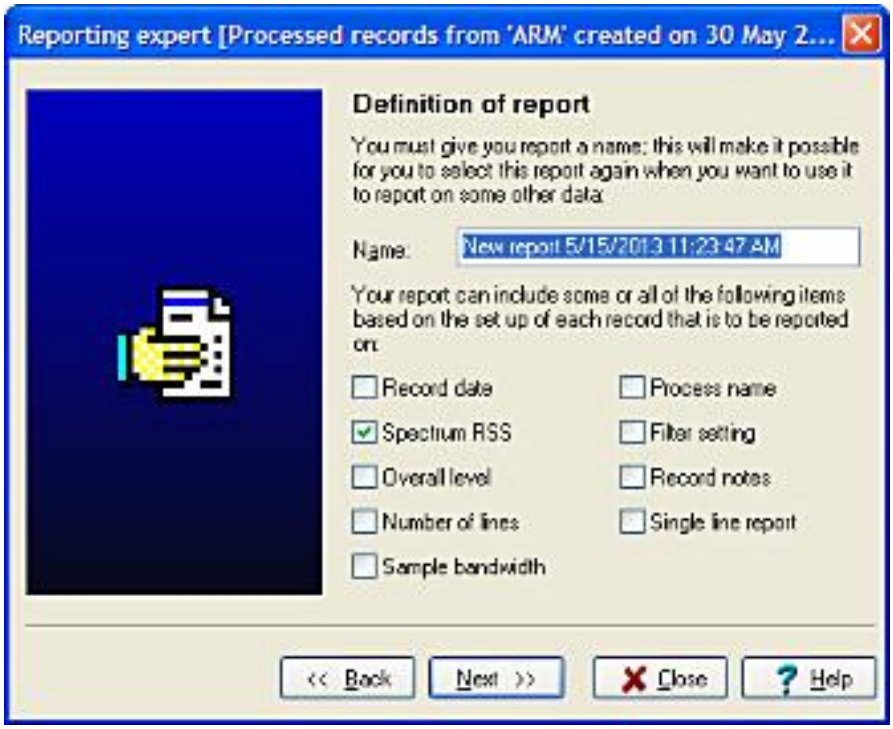

Figure 7 - 3.
Definition of Report Page.

- Enter or edit the report name in the **Name** field. This name is used to identify the report when selecting reports to display, and also appears as the first line of the report.
- Select the general record information items to include in the report.
- Select the **Single line report** item to output report items to single lines.
- Click **Next**. The **Reference record** page displays.

Reporting Expert: Reference Record

On the **Reference record** page, select a record to use as a reference when selecting signature lines or bands to use in the report's reporting items.

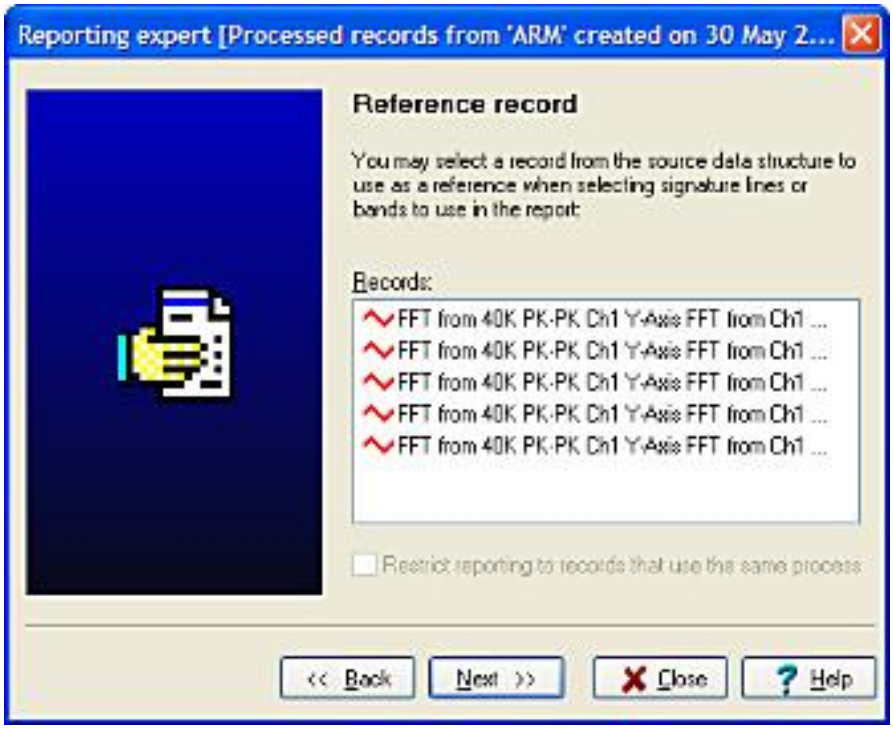

Figure 7 - 4.
Reference Record Page.

The **Records** list box displays all individual records in the selected data structure.

- Select the record to use as a reference from the **Records** list.
- Enable the **Restrict reporting**... checkbox to restrict the report to only records with a particular process type.
- Click **Next.** The **Select report items** page displays.

Reporting Expert: Select Report Items

On the **Select report items** page, create, edit, and delete the reporting items to use in the selected report.

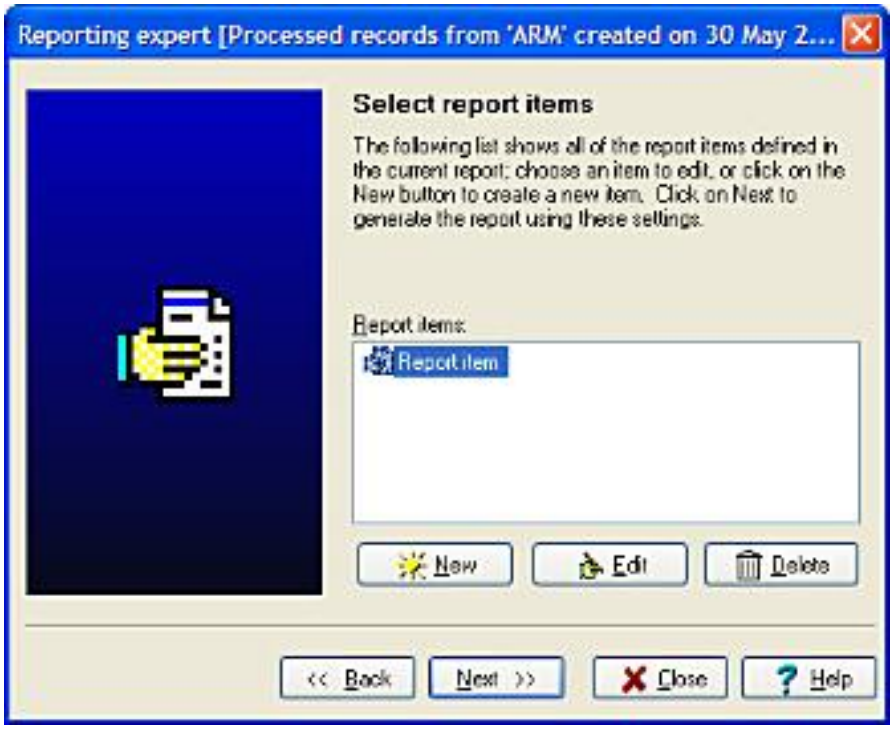

Figure 7 - 5.
Select Report Items Page.

The **Report items** list box displays all report items in the selected report.

To delete a report item:

- Select the item from the **Report items** list and click **Delete**.

To create a new report item:

- Click **New**.

To edit a report item:

- Select the item from the **Report items** list and click **Edit**.

When you click **New** or **Edit**, the **Definition of report item** page displays, allowing you to define the report item. When you have finished defining the report item, ARM returns to the **Select report items** page. Continue to create and edit report items as necessary.

- Click **Next**. The report generates and displays.

Reporting Expert: Definition of Report Item

On the **Definition of report item** page, enter a report item name and specify whether this item reports on a single signature value or on a band of values from the record.

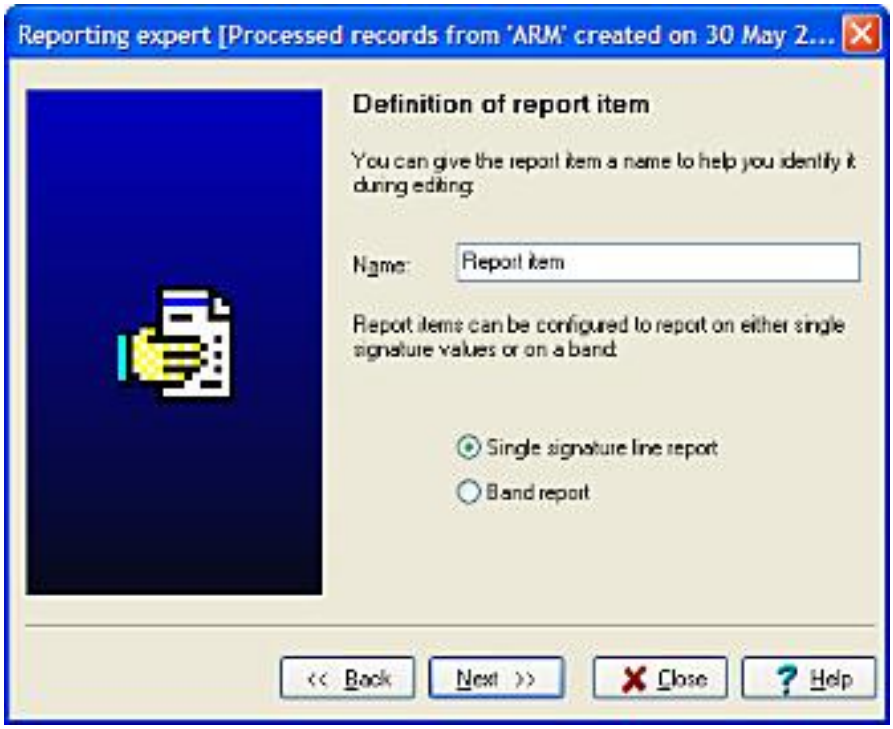

Figure 7 - 6.
Definition of Report Item Page.

- Enter or edit the report item name in the **Name** field. This name is used to identify the report item when editing reports in the program.
- Choose whether the report item is used to report on a single signature amplitude or on a band of values.

  Single signature line report - Select to report on the peak value or on a selected position.

  Band report - Select the lower and upper positions from a graph of the signature, and choose to report on the band peak or the band power (RSS).
- Click **Next**. The **Signature band report item** page or **Single signature value report item** page displays, depending on your selection.

Reporting Expert: Single Signature Value Report Item

On the **Single signature value report item** page, specify how to use the report item being edited based on a single value taken from the signature.

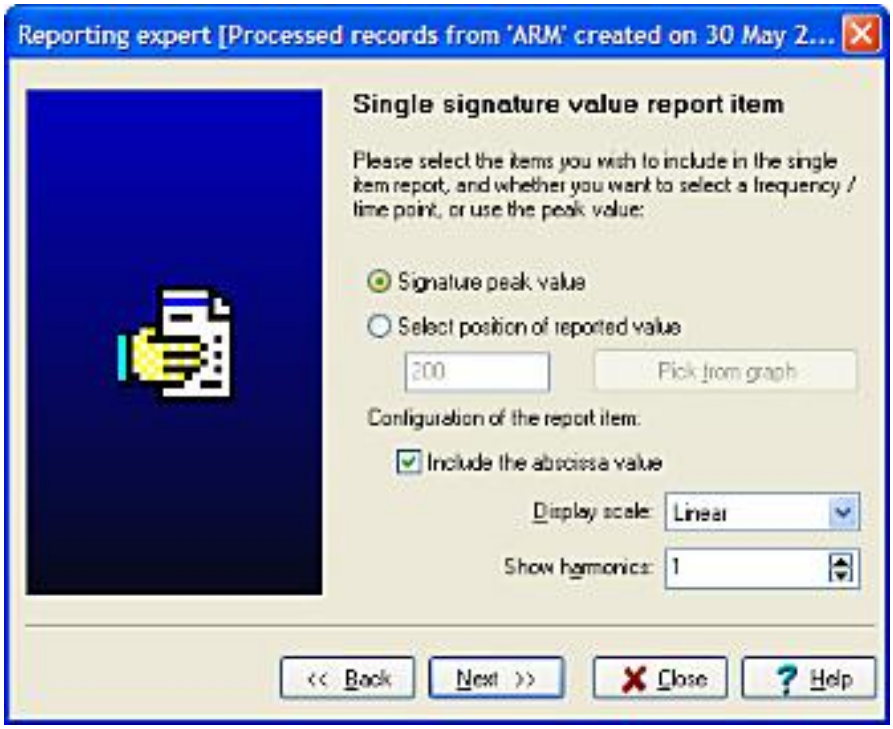

Figure 7 - 7.
Single Signature Value Report Item Page.

- Determine whether the report item reports on the peak amplitude of the signature or the amplitude at a selected position.

  Signature peak value - Select to report on the peak amplitude of the signature.

  Select position of reported value - Select to report on the amplitude at a selected position. Enter the time or frequency value into the **Position** text box or click **Pick from graph** to open a simple graph window and select the position using the normal single cursor function.

- Enable the **Include the abscissa value** checkbox to include the X value in the report.
- Select a display scale type from the **Display scale** drop down list to direct the output into a standard display unit.
- In the **Show harmonics** selection box, specify the number of harmonics of the selected position to include in the report.
- Click **Next**. You return to the **Select report items** page.

Reporting Expert: Signature Band Report Item

On the **Signature band report item** page, specify how to use the report item being edited to display information based on a band across the signature.

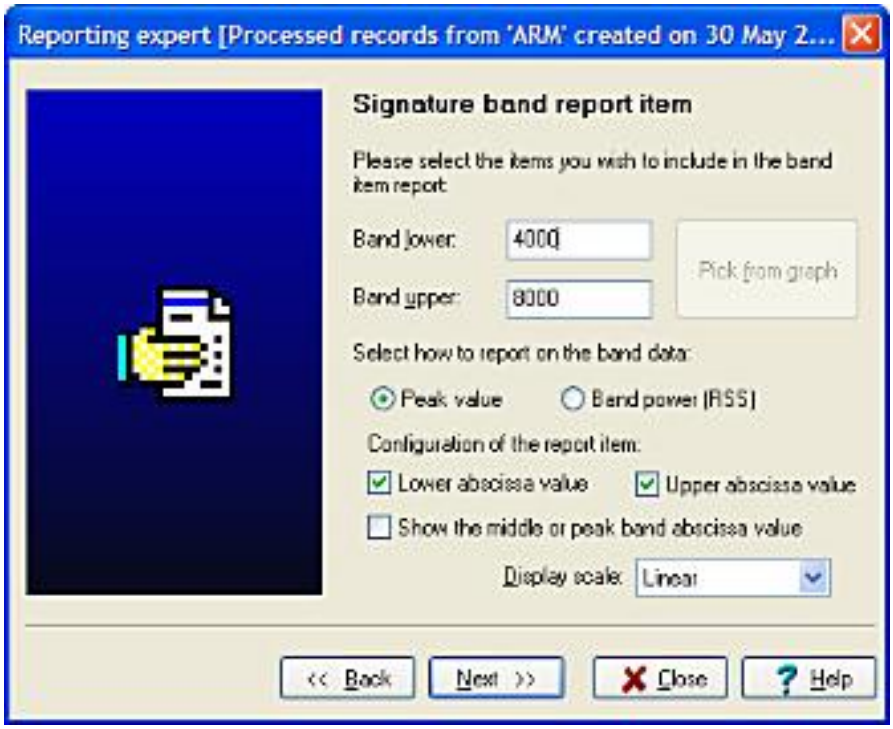

Figure 7 - 8.
Signature Band Report Item Page.

- Enter the time or frequency values into the **Band lower** and **Band upper** text boxes, or click **Pick from graph** to open a simple graph window and select the position using the band (power) cursor function.
- Determine whether the report item reports on the peak amplitude found in the band or the band RSS.

  Peak value - Select to report on the peak amplitude of the signature within the band.

  Band power (RSS) - Select to report on the band RSS (power).
- Include band start, center, and end positions in the report item by enabling the following:

  Lower abscissa value
  Upper abscissa value
  Show the middle or peak band abscissa value
- Click **Next**. You return to the **Select report items** page.

Word Reports

Report Generator for Microsoft Word

Export data and graphic plots to Microsoft Word documents using template files and bookmarks. Design your document in Word and save it as a template file, using bookmarks to place text or graphics; then link these to a Word report in ARM. ARM also comes bundled with a number of predefined templates and associated reports to use as examples or to get started.

You may also export to a blank document without using bookmarks (a no-bookmark report); in this case, a simple table of values is created, with fields written in the order that the software exports them.

ARM generates Word reports using any version of Word (2000 and newer).

To generate a Word report from your data:

- Select the **Reports** menu's **Word Report Generator Expert**. The **Report Generator for Microsoft Word** wizard launches and guides you through the steps necessary to create the reports.

Figure 7 - 9.
Report Generator for Microsoft Word Wizard.

- Click **Next.** The **Select report** page displays.

Report Generator for Microsoft Word: Report Selection

On the **Select report** page, a list of available Word reports display to apply to all records within the source data.

Figure 7 - 10.
Select Report Page.

- Select a report from the **Reports** list, or click **New** to create a new report.
- Click the browse button to load or save a report or to move a report item up or down the list.
- Click **Next**. The **Definition of report** page displays.

To delete a report:

- Select a report from the **Reports** list and click **Delete**.

Report Generator for Microsoft Word: Definition of Report

On the **Definition of report** page, specify a name and document template file (.dot) to use as a template for the report.

- Leave the **Template** field empty to run a "no-bookmark" report. The report applies to all records within the source data; you can choose to output the records as they display in their multiple plot/waterfall format, or as individual traces.

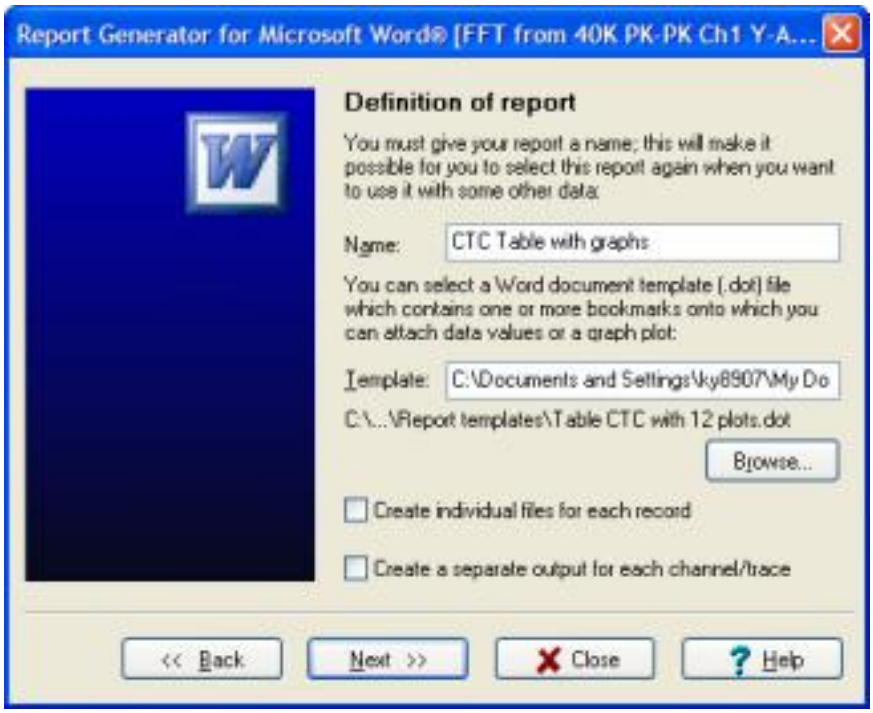

Figure 7 - 11.
Definition of Report Page.

To generate separate documents for each individual trace in the data:

- Enable the **Create individual files for each record** checkbox.
- If your selected data contains CTC results, enable the **Create a standard report** checkbox to output data from CTC results to a standard report.

To generate separate plots for multiple channel data:

- Enable the **Create a separate output for each channel/trace** checkbox. The generated Word report displays a separate graphic plot for each channel.
- Click **Next** to display the **Selection of fields and bookmarks** page for standard reports or the **CTC results** page for CTC files.

Report Generator for Microsoft Word: Check-to-Conformance Results

On the **Check-to-conformance results** page, set up your Word report fields to receive the CTC results, associating bookmarks in the chosen document template file (.dot) with report elements in your data.

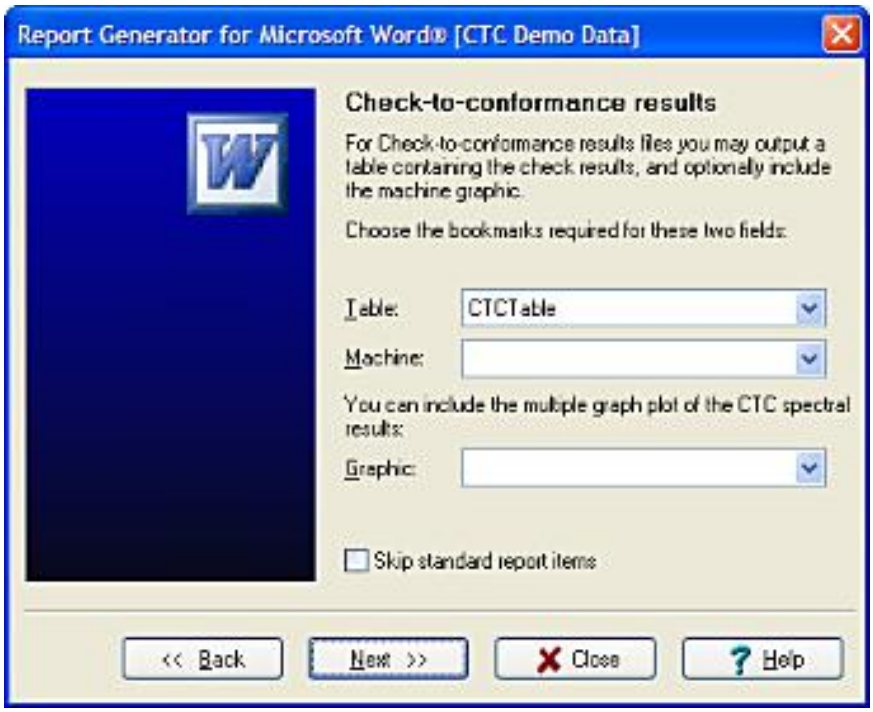

Figure 7 - 12.
Check-to-Conformance Results Page.

CTC reports contain the CTC report, which is a table of measurement results and status values, and a set of spectral readings.

The CTC report can provide three output items to the document: the results table, the machine graphic, and the multiple plot of the CSV results.

To assign a bookmark to one of these fields:

- Select the bookmark from the **Table, Machine**, and **Graphic** drop down list box.
  - If you are running a no-bookmark report, values write to the document in the order that they appear.
- Enable the **Skip standard report items** checkbox if you do not wish to specify any standard report elements for this report.
  - Special rules govern how CTC results are output to Microsoft Word reports.
- Click **Next.** The **Selection of fields and bookmarks** page displays. If you have enabled **Skip standard report items**, the **Select file output** page displays.

Report Generator for Microsoft Word: Fields and Bookmarks

On the **Fields and Bookmarks** page, set up your Word report fields, associating bookmarks in the template file with report elements in your data.

The **Record fields** list box displays all of the report elements and bookmarks available for output to a Word report. The first column lists the record fields; the second column displays names of any bookmarks assigned to these fields.

Figure 7 - 13.
Report Generator for Microsoft Word Fields and Bookmarks.

To assign a bookmark to a field:

- Select the field from the **Record fields** list box.
- Select a bookmark from the **Select bookmark** drop down list. The name of the selected bookmark appears next to the field name.

If you are running a no-bookmark report, values write to the document in the order that they appear in the **Record fields** list.

- Click **Next**. The **Select report items** page displays, if enabled on the **Program Options / Updates/Reports** dialog. Otherwise, t**he Select file output** page displays.

Report Generator for Microsoft Word: Select Report Items

On the **Select report items** page, create, edit, and delete the reporting items to use in the selected report. Report items include amplitudes at individual signature positions, or peak or RSS within user defined bands. You can also configure each item to include the ordinate value (time or frequency).

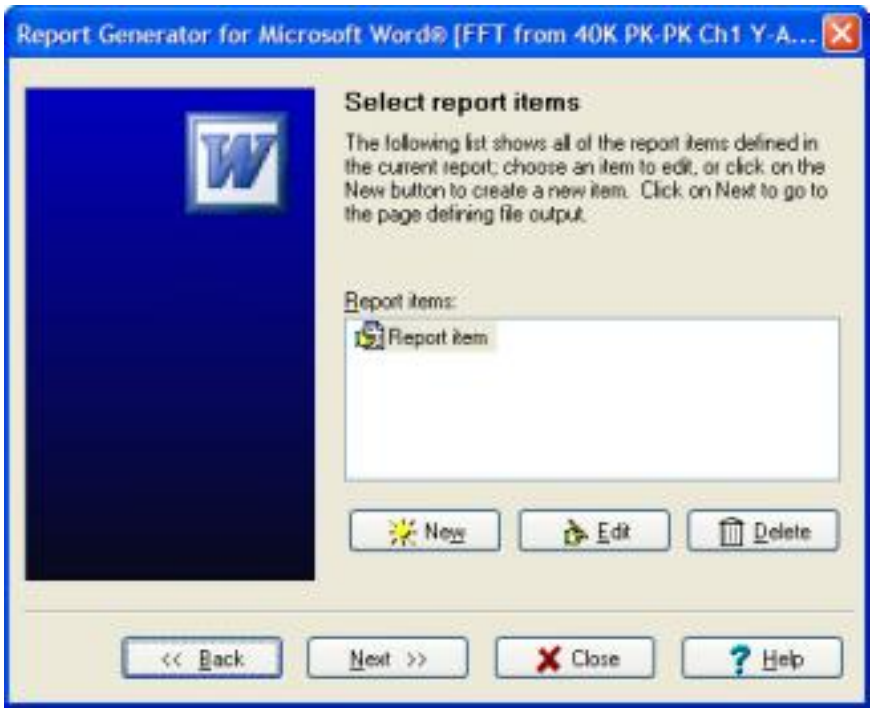

Figure 7 - 14.
Select Report Items Page.

- The **Select report items** page and all pages associated with this page are optional and only display in the Report Generator for Microsoft Word if enabled on the **Program Options / Updates/Reports** dialog.

The **Report items** list box displays all report items in the selected report.

To delete a report item:

- Select the item from the **Report items** list and click **Delete**.

To create a new report item:

- Click **New**.

To edit a report item:

- Select the item from the **Report items** list and click **Edit**.

When you click **New** or **Edit**, the **Definition of report item** page displays, allowing you to define the report item. When you have finished defining the report item, ARM returns to the **Select report items** page. Continue to create and edit report items as necessary.

- Click **Next**. The report generates and the **Select file output** page displays.

Report Generator for Microsoft Word: Definition of Report Item

On the **Definition of report item** page, enter a report item name and specify whether this item reports on a single signature value or on a band of values from the record.

Figure 7 - 15.
Definition of Report Item Page.

- Enter or edit the report item name in the **Name** field. This name identifies the report item when editing reports in the program.
- Choose whether the report item is used to report on a single signature amplitude or on a band of values.

  Single signature line report – Select to report on the peak value or on a selected position.

  Band report – Select the lower and upper positions from a graph of the signature, and choose to report on the band peak or the band power (RSS).
- Click **Next**. The **Signature band report item** page or **Single signature value report item** page displays, depending on your selection.

Report Generator for Microsoft Word: Signature Band Report Item

On the **Signature band report item** page, specify how to use the report item being edited to display information based on a band across the signature.

Figure 7 - 16.
Signature Band Report Item Page.

- Enter the time or frequency values into the **Band lower** and **Band upper** text boxes, or click the **Pick from graph** button to choose the values from the graph.
- Determine whether the report item reports on the peak amplitude found in the band or the band RSS.

  Peak value - Select to report on the peak amplitude of the signature within the band.

  Band power (RSS) - Select to report on the band RSS (power).
- Include band start, center, and end positions in the report item by enabling the following:

  Lower abscissa value
  Upper abscissa value
  Show the middle or peak band abscissa value
- Click **Next**. You return to the **Select report items** page.

Report Generator for Microsoft Word: Single Signature Value Report Item

On the **Single signature value report item** page, specify how to use the report item being edited based on a single value taken from the signature.

Figure 7 - 17.
Single Signature Value Report Item Page.

- Determine whether the report item reports on the peak amplitude of the signature or the amplitude at a selected position.
- Select the **Signature peak value** option to report on the peak amplitude of the signature.
- Select the **Select position of reported value** option to report on the amplitude at a selected position. Enter the time or frequency value into the **Position** text box.
- Enable the **Include the abscissa value** checkbox to include the X value in the report.
- Select a display scale type from the **Display scale** drop down list to direct the output into a standard display unit.
- Specify the number of harmonics of the selected position to include in the report from the **Show harmonics** selection box.
- Click **Next**. You return to the **Select report items** page.

Report Generator for Microsoft Word: Select File Output

On the **Select file output** page, specify the output path and file names to be generated by your Word report.

Figure 7 - 18.
Select File Output Page.

- Select the file naming convention for each record:

  Use record name for file name - Uses the name of the record for the file name.

  Use GUID for file name - Creates a GUID for the file name.

  Use a custom name for file name - Uses a custom stem for the file name, appended with a number to make it unique. Enter the stem to use in the **Name** field.

  - If the file name generated by the software is already in use, the new file takes the same name but appended by a number to make it unique.

- Specify the folder where the files are written using the **Output path** text box; type it in or **Browse** to locate an already existing folder. If you enter a path that does not exist, when you click **Next**, the software asks you if you want to create it.
- Click **Next**. The report generates and the **Reporting complete** page displays.

Report Generator for Microsoft Word: Reporting Complete

A summary of the files created from your Word report displays.

Figure 7 - 19.
Reporting Complete Page.

Balancer Reports

Balancer reports can include some extra data that you enter yourself using the **Balancer Report Information** dialog. This includes some information not stored in the Balancer file, such as operator name and correction weight information.

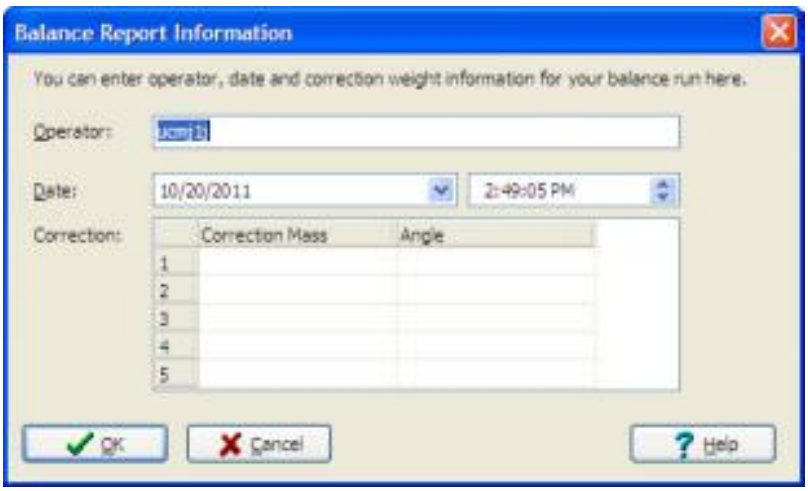

Figure 7 - 20.
Balancer Report Information Dialog.

To open the Balancer Report Information dialog:

- Select the **Edit** menu's **Enter Balancer report data** option.

The following items are entered on this form and stored with the data structure:

Field	Notes	Bookmark identifier in report
Operator	Taken from user login initially	Operator Name
Date	Date and time of Balancer; note that only the date part is used in the document	Record Date
Correction Mass	Mass of the correction weight	CorrectionWeight1 .. 5
Angle	Angle position of the correction weight	CorrectionWeightAngle1 .. 5

To generate Word documents from your Balancer reports:

- Select the **Reports** menu's **Word Report Generator Expert**. The **Report Generator for Microsoft Word** wizard launches and guides you through the steps necessary to create the reports.

As with the text reports, define as many reports as you like, and run them directly using the **Reports** menu's **Default Word Report** and **Select Word Report** options; you may also delete reports from there.

Balancer Reports Special Rules

Special rules govern how Balancer report files export to Microsoft Word reports:

- Balancer report files contain two columns of text information. The first column includes the name of the parameter and the second column contains the value; this is either text, a two part enumerated type (e.g., 0 RMS) or a magnitude and phase pair (e.g., 2.31@360).
- When exported by ARM into a Word document, the name and timestamp of the original source file may be included.
- You can only export one Balancer report to one Word document.
- The Balancer report can provide any output items from the Balancer file to the Word document. As with other Word reports, inclusion of any of these elements is optional.
- For Balancer reports using a Word template, you should use bookmark properties for those output items required; none of the standard report elements are available. Note that the Balancer report does not actually use the third bookmark, for the results table (it is provided for support to other supplementary file types that contain only text data).
- For non-template reports, the report items are output to a plain table. The format of this table is based on your normal document template (normal.dot), meaning you can customize its appearance by modifying your default table format.
    - In order to support future upgrades to the Balancer module, the definition of the Balancer report fields are stored in a CSV file located in the ARM program directory, called BalanceReport.csv. You can edit this file yourself to update the fields used in the report.

Balancer Reports – Polar Plot

When generating a Balancer report using the **Report Generator for Microsoft Word**, you can select to include a polar plot or a table view in the report.

To select to include a polar plot or table view in your Balancer report:

- Select the **Reports** menu's **Word Report Generator Expert**. The **Report Generator for Microsoft Word** wizard launches and guides you through the steps necessary to create the reports.
- When you reach the **Selection of fields and bookmarks** page, select the **Graph or Table** item in the **Record fields** column.
- Select a bookmark from the **Select bookmark** drop down list. The name of the selected bookmark appears next to the **Graph or Table** field name.
- Click **Next** to continue with the Report Generator.

When viewing a balancing report in ARM, use the **View** menu's **Balance Table** and **Balance Polar Plot** options to toggle between displaying the table and polar plot.

Bookmark Guidelines

Use the following guidelines to set up your bookmarks:

- You must have one or more bookmarks for each record to be output from your data structure.
- Only run multiple bookmark reports on whole data structures. If you run one on a record, only that record is reported on as a single element in the document.
- Define your bookmarks with identical names, ending with a number.

  For example, to output three records to a file, and include the record name and the graph plot for each, define six bookmarks in the template as follows:

  RecordName1
  Graph1
  RecordName2
  Graph2
  RecordName3
  Graph3

- You may use any set (those bookmarks ending with a number) when selecting the bookmarks in the **Selection of fields and bookmarks** page of the **Report Generator for Microsoft Word** wizard.
- You may omit numbers in the bookmark sequence in your template if you wish to only output certain records in your document.

  For example, if you had a data structure containing two Overall Vibration trend plots followed by four Overall Vibration single measurements (obtained by copying records) and wanted to present the information in that order, you could create bookmarks as follows in your template:

  Graph1
  Graph2
  Overall3

Overall4
Overall5
Overall6

The trend plots will attach to **Graph1** and **Graph2**; no plots will generate for the single measurements following because there are no other "GraphX" bookmarks. The single overall measurements following the two trend plots will attach to bookmarks **Overall3** to **Overall6**. No overall values from the trend plots will output because there are no **Overall1** and **Overall2** bookmarks.

- If you have a record containing two plots and you want to output it to a single document with two separate plots:
  - Create a template containing numbered bookmarks, with at least two "GraphX" bookmarks.
  - Select the "root" of your data structure.
  - On the Word Reporting Expert, enable the **Create a separate output for each channel/trace** option.
  - Do not enable **Create individual files for each record**.
  - Assign the first numbered graph bookmark to the "Graph plot" item in the report items list.
- If you have a record containing two plots (at the third level on the Explorer tree), it is not possible to create two documents containing one plot each. If you enable **Create individual files for each record**, a single file is produced, because in this context, "record" means the second level node, of which there is only one. In this case, you should move one of the individual third level objects to the root of the data structure (by dragging with the mouse) so that two objects are created at the second level. By then running the report against the root of the data structure, you will obtain two documents containing the individual plots.
- Note that, at present, Balance reports are not translated, so all terms output to the document will be in English.
- For Balance and Overall data, it is possible to generate a table in the Word document that is exactly the same as that shown in ARM. To do so, you should assign a bookmark in your template to the "Table" report item. Note the following formatting guidelines:
  - If you place the bookmark in a table in your template, the table row containing the bookmark must have the same number of cells (columns) as the table to be produced.
  - If you place the bookmark in "free text" (outside a table) in your template, ARM will create the table with the correct number of columns and rows. In this case, your template default formatting applies to the table.
  - If you wish to apply formatting to the table to be produced, you should create and format the table in your template, ensuring that it has enough columns.
- For Balance data, if you do not want to reproduce the entire table, but are only interested in some fields, you can use specific report items to attach parts of the table to bookmarks. Note the following:

- The report items are named after the identifiers in your balance data, for example, "IR" for Initial Run, "TWA" for Trial Weight added to Plane A.
- The balance report items utilize bookmark numbering - in fact, numbering is mandatory. Use 1 for the first item; for example, for "CW1", your bookmark name should end with a 1.
- There are separate report items for each plane, and for the value pairs to create (vibration amplitude and phase for the measurement runs, weight and angle for the weights). Each will require a separate bookmark. The report items are named to identify which is which. For example, for TWA phase value, the report item is called "TWA (phase)".
- The template can omit the numbered bookmarks for those items you do not require. For example, if you only want the first and fourth check run vibration measurements, you need to create two bookmarks. If the first is named CRAMag1, you need to name the other CRAMag4, and associate one of these with the "CRA_(Mag)" report item.

Direct Print

➢ Not applicable with 64-bit operating systems.

The ARMDirectPrint Windows Explorer Shell Extension allows you to directly print a report from a .pds file in Windows Explorer without launching ARM.

To directly print a report from a .pds file in Windows Explorer:

- Select a .pds file in Windows Explorer and right-click.
- From the .pds file's right-click menu, click **Print**. A print dialog displays, allowing you to specify your report printing options for one or more measurement records.

Fields include:

Available measurements – A list of the measurement records available for reporting. Select the measurement record for which you wish to print a report.

Print formats – Displays a drop down list of the available Word report templates currently defined in ARM. Select a template to apply to the printed report.

Select All – Click to select all of the measurement records in the **Available Measurements** list.

Unselect All – Click to deselect any currently selected measurement records in the **Available Measurements** list.

Show print dialog – When enabled, a standard print setup dialog displays when you click **Print**, allowing you to configure printing options. If disabled, when you click **Print,** the default printer settings are used to print the report.

- Click **Print** to print the report.
- Click **Cancel** to the cancel the report and return to Windows Explorer.

Creation of Templates for Word Reports

Introduction

You can output data from ARM to Microsoft Word documents using template files and bookmarks to produce documents formatted however you wish. You design your document in Word and save it as a template file, with bookmarks located where you want the text or graphics to go; then link these to a Word report in ARM.

If you want to output more than one record to a single document, you will need to use a special numbering convention in order for this to work.

ARM comes bundled with a number of predefined templates and associated reports that you can use as examples or to get you going.

- For output to Word documents, Microsoft Word must be installed correctly on your system and be registered (as happens normally) as an automation server – ARM does not do the actual writing of the documents, rather it controls Word invisibly to do this.

ARM will generate Word documents using any version of Word from Word 2000 on.

This document gives instructions on how to create templates in Word and add bookmarks to them. Note that Word 2003 was used for the examples here; other versions of Word may be slightly different but the principals remain.

You can also create Word documents without using templates with bookmarks – in this case, only simple tables and graphics are created, based on your normal template.

Creating a Template (.dot)

When you create a new document using Microsoft Word, the settings and properties for this new document are taken from a file called **normal.dot** – this file lives in a special place defined by Word itself.

If you want to customize how your default documents behave, you can open this file and modify anything in it – the normal font, the paragraph spacing, in fact anything that you can format in any Word document. When you save the file (keeping it as a template), it will provide your own preferred settings for new documents.

Further than this, you may create any number of template files defining different document formats, for instance, a standard home letter, a business letter, and so on.

To create a new document using a template, you use the **File / New** command in Word, which should provide you with a list of templates to choose from.

When prompted to save a template by Word, it usually offers you its standard template folder as a location, but you can in fact save templates to anywhere. The only difference is that only templates in the standard locations are made available when you choose **File / New** in Word.

- The only thing that distinguishes a template from a normal Word document is the file extension – everything else is the same. This means you can make any document into a template simply by changing its extension from **.doc** to **.dot**.
- You must **open** the template in a specific way in order to edit it – if you simply double-click on a template, Word will assume you are creating a

new document based on that template. You can tell this has happened because Word will show the document name as "Document x" rather than use the name of the template file opened.

To open a template for editing:

- Right-click on it and choose the **Open** command, instead of the **New** command.

There are three ways to create a template

- Open an existing template and save it under a new template name.
- Copy an existing template and rename it.
- Create a new document and select **Document template** from the **Save as type** list box when you save it.

As already mentioned, it doesn't matter where you save the template; ARM comes with a set of predefined templates that are stored in a "Report templates" folder within its data folder ("Analysis and Reporting Manager data" within your standard documents path).

Adding bookmarks

To add a bookmark to a template, choose **Insert / Bookmark** from the menu. The **Bookmark** dialog will appear:

Figure 7 - 21.
Bookmark Dialog.

Before doing any serious bookmark editing, you should make a temporary change to your Word set up that will make the whole process a lot easier.

- Go to **Tools / Options** and check the **Bookmarks** checkbox on the **View** tab.
- In Word 2007, go to the Microsoft Office logo (upper left corner) and look for the **Word-Options** button. Look for the field where you can set a preference for showing bookmarks.

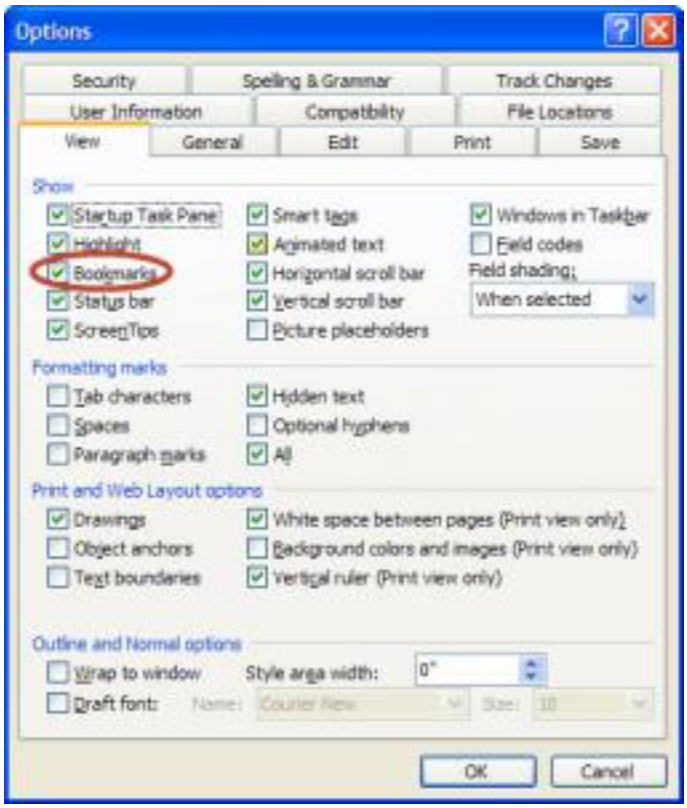

Figure 7 - 22.
Word 2003's **Options – View** Tab.

Checking the **Bookmarks** control will make all bookmarks visible in your document as grey I-beams, as shown here:

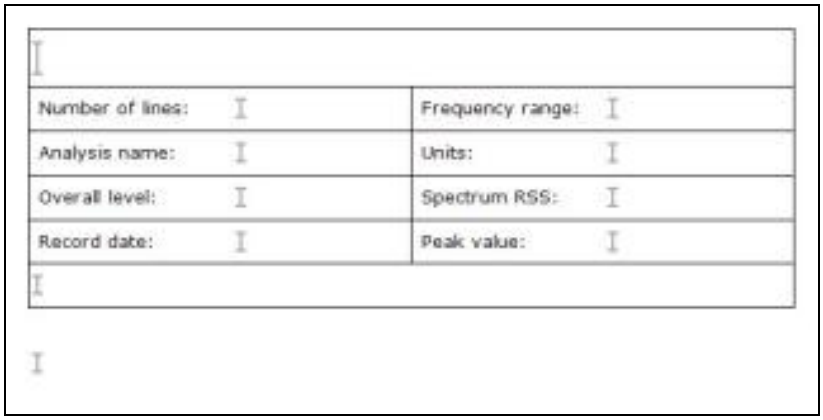

Figure 7 - 23.
Visible Bookmarks in Word Template.

This makes it easier to see where you have placed them, although there is still room for confusion, as you will see!

- The **Bookmark** dialog allows you to view the bookmarks in the document sorted by name or location; it is easier to use the latter when adding new bookmarks to a template:

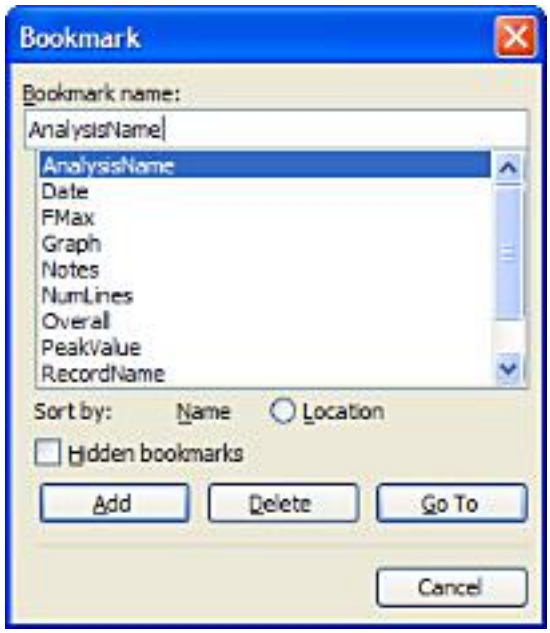

Figure 7 - 24.
Bookmark Dialog.

- Bookmark names must contain no spaces.

To add a bookmark:

- Place the cursor at the position in your document where the bookmark is to go. This may be in free text, within a text box, or in a table.
- Choose **Insert / Bookmark** to display the **Bookmark** dialog.
- Type in a name for your bookmark.
- When you have entered the name, click **Add** to add it to the list; the **Bookmark** dialog will close. A grey I-beam will appear in your document at the chosen location.
- To confirm the bookmark was entered correctly, choose **Insert / Bookmark** and you should see your new bookmark in the list.
- To add further bookmarks, simply repeat the above process, remembering to move your insertion point each time to the correct location.

Setting up a Template Report in ARM

Using the **Report Generator for Microsoft Word** window, you can create any number of "reports" that define the template, link bookmarks in the template to report elements from your data (including record name, reading date, spectral parameters, notes, and graph plot), and the name and location of the files created.

When you select a template, ARM reads it and extracts the list of bookmarks it contains; you can then associate any report item you wish to include in the output with whichever bookmark is appropriate.

For example, if your template contains a bookmark called "GraphPlot" that defines where you wanted the graphical plot to go, you would select "Graph" from the report elements list and pick the "GraphPlot" bookmark from the bookmark list.

You may also add in as many report items to your report as you wish, allowing you to output simple data analysis. Reporting items in ARM Software text reports and Word reports can include amplitudes at individual signature positions, or peak or RSS within user defined bands. You can also configure each item to include the ordinate value (time or frequency).

Finally, you can choose the document naming to use – you can choose either the record name, a GUID, or use a custom name (to which is added a number to keep each file unique).

- A GUID is a 128-bit Globally Unique Identifier. When created by your computer system, this value will be unique. GUIDs are numerical, but are usually shown in the following form: {0F447726-A5E1-4340-AAD7-3DEC78B2CCBD}

You can also choose which directory to write the files into; this is specific per report, allowing you to direct output to different places.

Once complete, click on the **Next** button to run the report. A progress bar shows you feedback and once completed, if there were no errors, you can choose to view your documents in Word. Predefined reports may be run directly using the **Default Word report** command, which when placed on a toolbar, will include a drop down list allowing you to run any report directly:

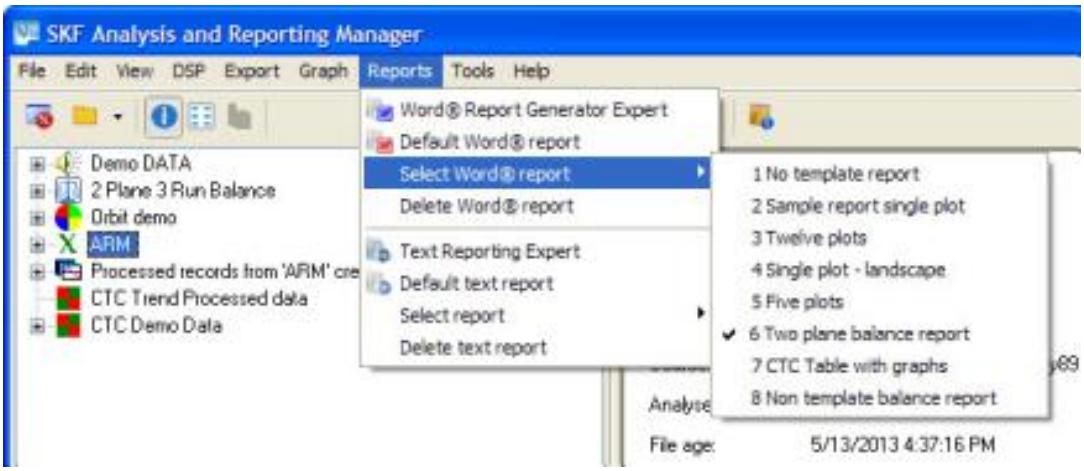

Figure 7 - 25.
Select Word Report Option.

Output of CTC Data

Special rules govern how CTC results are output to Microsoft Word reports.

CTC reports contain two things: the CTC report, which is a table of measurement results and status values, and a set of spectral readings.

The CTC report can provide three output items to the document - the results table, the machine graphic, and the multiple plot of the CSV results. Alternatively, you can choose to ignore the CTC results and simply output the individual spectral records like a standard report.

For CTC reports using a Word template, three bookmark properties are available for the three output items. In addition, you can select the standard report template items, but will only operate on the first record taken, including its graph plot.

For non-template reports, the three CTC output items are output to a plain table and two stand alone images. If selecting any standard report elements, they will be output to the single document, in sequence at the end, one per spectrum in the CTC.

8
Import/Export

Export Format ASCII, UFF, Excel

ARM can export data to ASCII, UFF, and Excel file formats.

To export data to one of these formats:

- Select the hierarchy item from the data structure, and select the **Export** menu's **ASCII**, **UFF**, and **Excel** export option. The **Export format** dialog displays, where you can specify parameters for export.
- Select the **Export all records to multiple files** checkbox to export records to separate files; type in the **Export folder** directly or **Browse** to a folder.

Or:

- Enable the **Export all records to a single file** checkbox to export all records to a single file; type the file name in the **Single output file name** control or select an existing file to overwrite.
- In ASCII and Excel export, enable the **Include header information** checkbox to include the header information with each record, and enable the **Output multiple records to multiple column** checkbox to export multiple records using the same process parameters as a multiple-column export.
- In UFF output, click **UFF Options** to access the **UFF Options** dialog, where you can choose various settings, including output to the ICATS Transfer Function file format.
- Click **OK** to begin the export.

Export Format HTML

ARM can export data to HTML file format.

To export data to HTML file format:

- Select the hierarchy item from the data structure, making sure the graphic plot displays, and select the **Export** menu's **HTML export** option. The **Save As** dialog displays.
- Specify the filename and location of the HTML file output.
- Click **Save** to begin the export. The HTML file is created and stored in the specified location, along with a .JPEG file of the plot.

Export Format PDF

ARM can export data to PDF file format.

To export data to PDF file format:

- Select the hierarchy item from the data structure, making sure the graphic plot displays, and select the **Export** menu's **PDF export** option. The **Export data to PDF** dialog displays.
- Specify the filename and location of the PDF file output.
- Click **Save** to begin the export. The PDF file is created and stored in the specified location.

ASCII and Excel Import Wizard

Import from File Wizard

The **Import from file** wizard allows you to view the contents of ASCII or Excel data files and specify how ARM interprets the data. The file contents display in the upper panel. The lower panel displays parameters for you to specify the data format.

To launch the Import from file wizard:

- Select the **File** menu's **Open a data file** or **Open source directory** option.
- Select the file or directory you wish to open. The file or directory opens in the **Import from file wizard**. The **General** page displays first.
- Use the navigation buttons at the bottom-right to proceed through the wizard.

To use the same settings for all following files/worksheets to be read in the current import process:

- Enable the **Apply same settings to all files** checkbox.
- If you imported a directory, enable the **Import all to a single branch** checkbox to add the data in each file to a single record, allowing you to display all the spectra on one plot.

Import from File Wizard: General Page

On the **General** page, specify how the fields will display and how the data is separated.

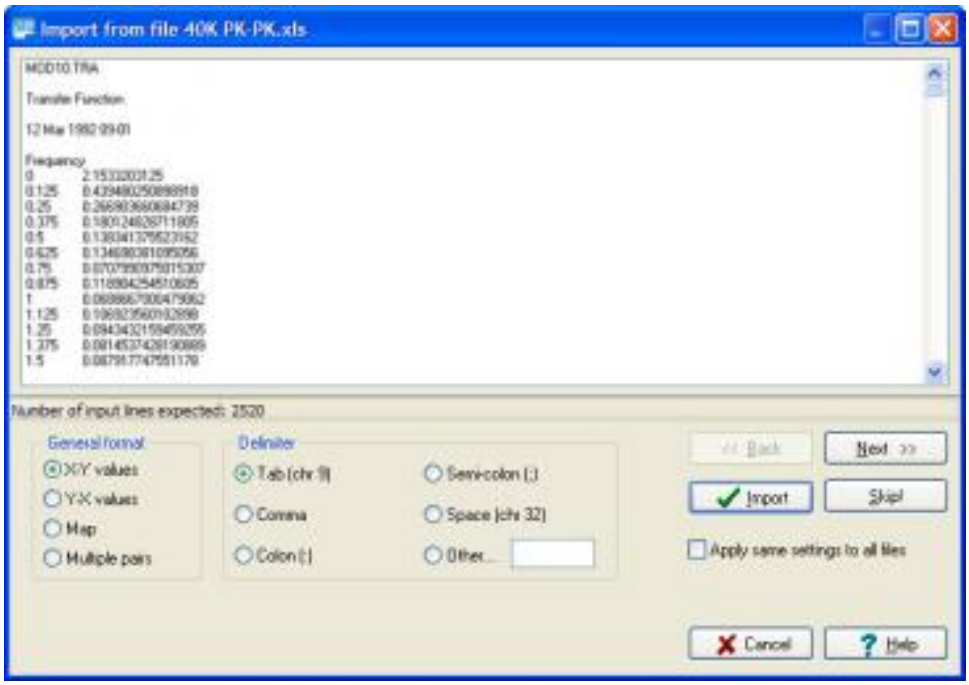

Figure 8 - 1.
Import from File Wizard – General Page.

General format area:

- Select the format for how the fields will display.

Fields include:

X-Y values – Data is arranged in two or three columns, displaying the X values first, followed by one or two columns of amplitude values.

Y-X values – Data is arranged in two or three columns, displaying one or two columns of amplitude values first, followed by the X values.

Map – Data is arranged in three or more columns, displaying the X values first, followed by any number of columns of amplitude values.

Multiple pairs – Data is arranged in sets of two or three columns, displaying each set containing the X values first, followed by one or two columns of amplitude values.

Delimiter area:

- Select the type of delimiter used to separate the data.

Fields include **Tab**, **Comma**, **Colon**, **Semi-colon**, **Space**, or **Other**. If you select **Other**, type the delimiter in the text box.

As you change these settings, ARM automatically analyzes the import data to see if it fits and displays the results in the status panel at the bottom of the page.

- Click **Next**. The **First Line** page displays.

Import from File Wizard: First Line Page

On the **First Line** page, specify the first line containing data values and the first column in the selected first line.

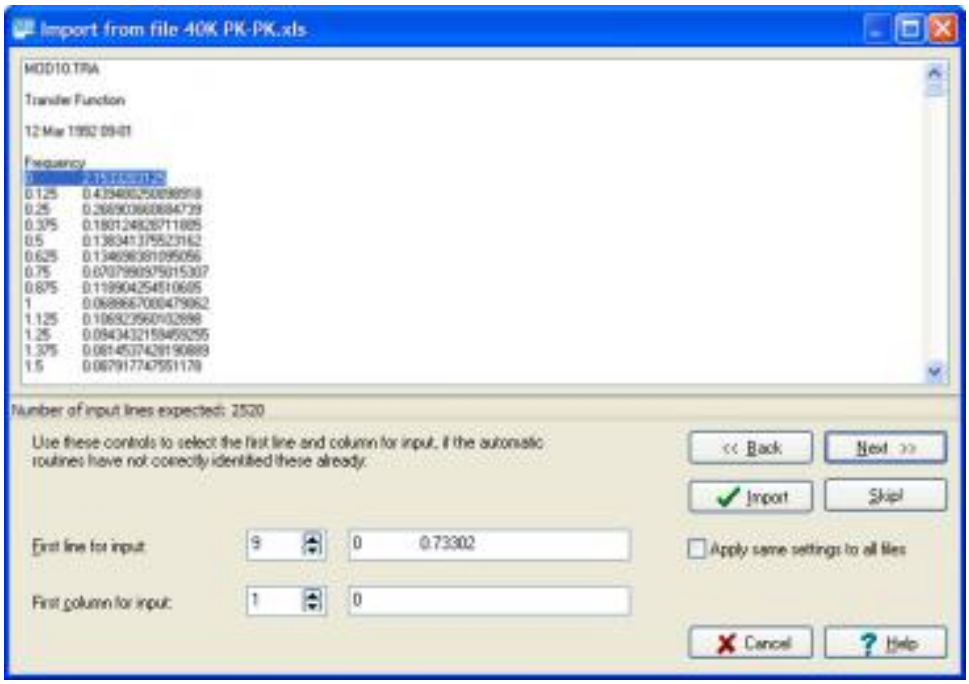

Figure 8 - 2.
Import from File Wizard – First Line Page.

- Select the first line for input using the **First line for input** up/down arrows. ARM highlights the line in the upper panel as it is selected; the contents of this line display in the text box next to the **First line for input** control.
- Select the first column for input using the **First column for input** up/down arrows. The contents of this first column preview in the text box next to the **First column for input** control.

As you change these settings, ARM automatically analyzes the import data to see if it fits and displays the results in the status panel at the bottom of the page.

- Click **Next**. The **Amplitude Format** page displays.

Import from File Wizard: Amplitude Format Page

On the **Amplitude Format** page, specify the input units and scales amplitude format of the data values.

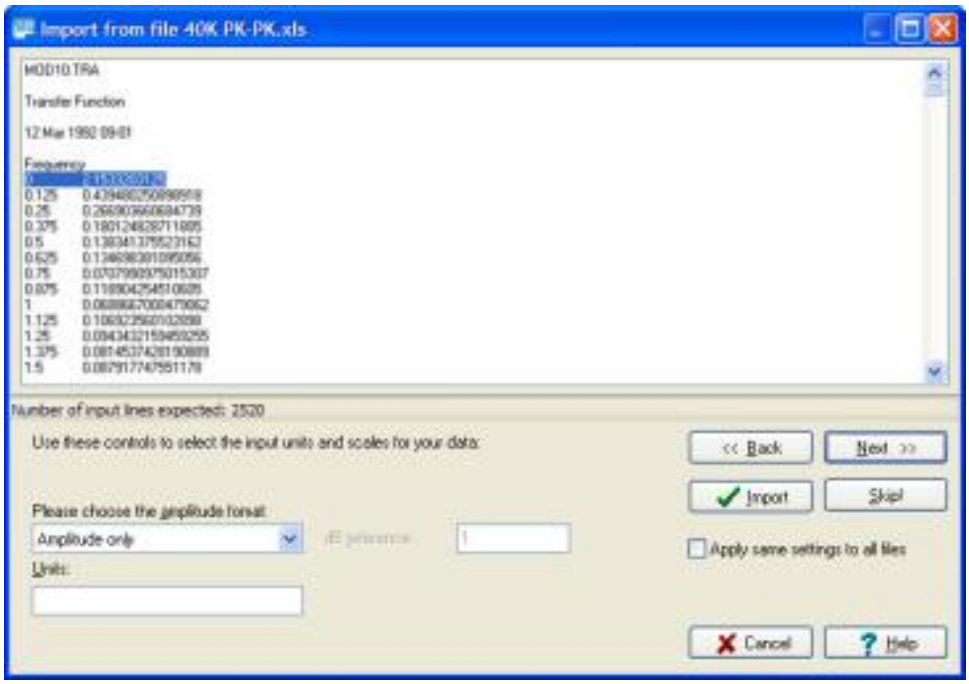

Figure 8 - 3.
Import from File Wizard – Amplitude Format Page.

- Select the amplitude format from the **Please choose the amplitude format** drop down list.

Options include:

Amplitude only – The data values contain linear amplitude magnitude values.

Amplitude in dB – The data values contain amplitude values expressed in Decibels. When you select this option, the **dB reference** control enables, allowing you to specify what value to use as the dB reference.

Real plus imaginary – The amplitude values contain real and imaginary values in adjacent columns of the input.

Magnitude plus phase – The amplitude values contain linear magnitude and phase values in adjacent columns of the input.

> ➢ The **Amplitude Format** control allows you to specify the format in which the data is read; however, you can always select different output scales when viewing the data.

- Enter the units used for the vertical axis values in the **Units** text box.

As you change these settings, ARM automatically analyzes the import data to see if it fits and displays the results in the status panel at the bottom of the page.

- Click **Next**. The **X-Axis Page** displays.

Import from File Wizard: X-Axis Page

On the **X-axis** page, specify the format of the x-axis values.

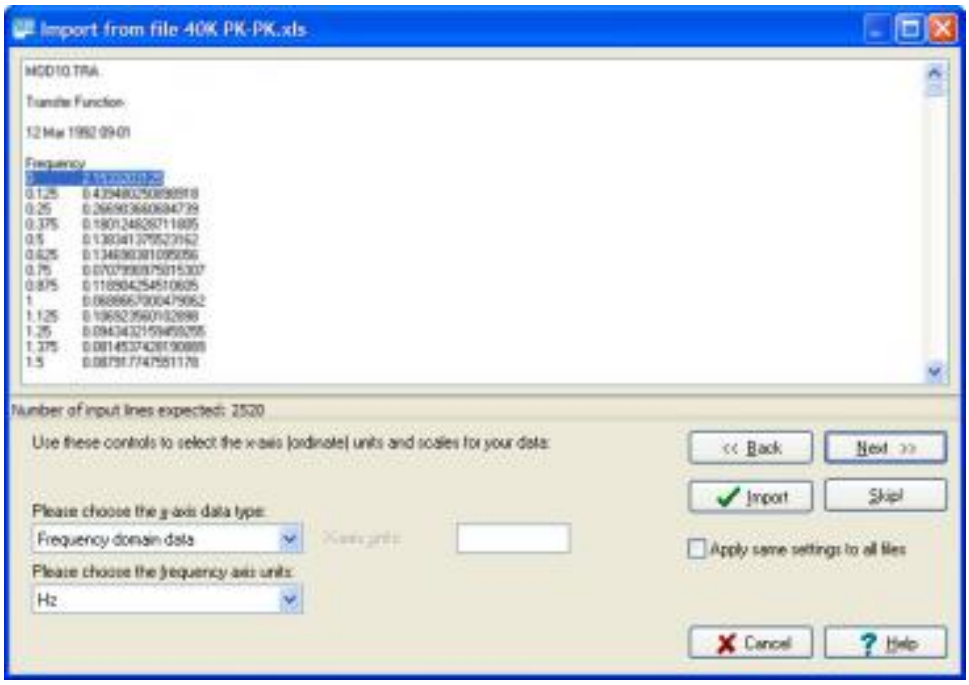

Figure 8 - 4.
Import from File Wizard – X-Axis Page.

- Select the X-axis data type from the **Please choose the x-axis data type** drop down list.

Options include:

Time domain data – The data values represent a time-domain signature. You must specify the amplitude format as **Amplitude only** values.

Frequency domain data – The data values represent data in the frequency domain. When you select this option, you must specify **Hz**, **CPM**, or **Orders** in the **Frequency axis units** drop down list.

Notated x-axis data – Choose this option when the x-axis values are not spaced evenly along the x-axis; for example, when importing octave analysis data. When you select this option, you must specify the x-axis units in the **x-axis units** text box.

As you change these settings, ARM automatically analyzes the import data to see if it fits and displays the results in the status panel at the bottom of the page.

- Click **Next**. The **Trace Process** page displays.

Import from File Wizard: Trace Process Page

On the **Trace Process** page, specify an optional trace process for the data. When you choose the X-axis parameters, ARM automatically selects the most suitable trace process for you.

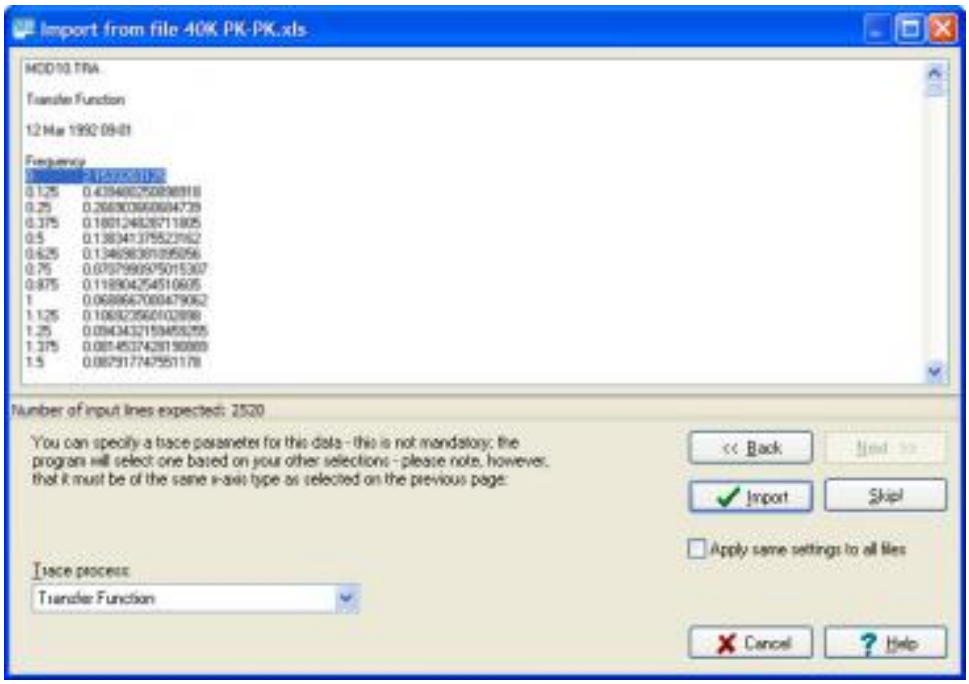

Figure 8 - 5.
Import from File Wizard – Trace Process Page.

To select a different trace process:

- Select a trace parameter from the **Trace process** drop down list.

Options include:

Spectrum CH1 – Power spectrum from channel 1.

Spectrum_CH2 – Power spectrum from channel 2.

PSD_CH1 – Power spectral density process from channel 1.

PSD_CH2 – Power spectral density process from channel 2.

TimeDomain_CH1 – Time domain from channel 1.

TimeDomain_CH2 – Time domain from channel 2.

CH1_Minus_CH2 – Time domain, channel 1 minus channel 2.

Diff_CH1 – Differentiated time domain from channel 1.

Int_CH1 – Integrated time domain from channel 1.

Diff_CH2 – Differentiated time domain from channel 2.

Int_CH2 – Integrated time domain from channel 2.

ThirdOct_CH1 – Third octave analysis from channel 1.

FullOct_CH1 – Octave analysis from channel 1.

ThirdOct_CH2 – Third octave analysis from channel 2.

FullOct_CH2 – Octave analysis from channel 2.

TransferFn – Transfer function.

Coherence – Coherence.

CrossCorr – Cross correlation.

CrossSpectrum – Cross spectrum.

- If you are unsure about the process, use ARM's default settings.

Restrictions caused by these selections are based on the analysis type. For example, if you choose a time-domain process, the vertical scale on output is restricted to magnitude (or real) values only; integration is not available, and the data cannot be placed on a map.

As you change these settings, ARM automatically analyzes the import data to see if it fits and displays the results in the status panel at the bottom of the page.

The **Import** button enables when the parameters match what ARM finds in the data (see *Validating the Import Data*).

- Click **Import**. The **Trace Process** page displays.

Validating the Import Data

The **Import from file** wizard allows you to view the contents of ASCII or Excel data files and specify how ARM interprets the data.

As you specify the format of the import data, ARM checks the imported data against these settings to ensure they are logical and allow the data to be imported and displays the results in the status panel at the bottom of the page.

If all is well, the number of lines of data displays in the status panel. If an error occurs, the status panel displays "Error encountered analyzing source" and the error message.

Possible error messages include:

Invalid first line for input – The first line for input does not contain any valid numeric values.

Invalid number of columns in input – The first line for input contains valid numeric values, but there is not the expected number. For instance, you might have specified data in real+imaginary format, but there are only two columns of data (remember, the X-axis values are always required).

Invalid trace process selected – There is a conflict between your specified X-axis format and the trace process selected.

UFF Options

The **UFF Options** dialog allows you to configure how data is processed and written into ASCII files in Universal File Format (UFF).

To access the UFF Options dialog:

- Click **Tools / Program options**, select the **File options** tab, and then click the **UFF options** button.

Reference Nodes Tab

On the **Reference nodes** tab, specify the response and reference coordinate information written into the UFF file header.

Figure 8 - 6.
Reference Nodes Tab.

- Select an option for identification of the response and reference coordinate information.

Fields include:

Use information taken from the analyzer record name – Use if the records have been stored using a name that uses one of the following two naming conventions:

- **XaaaYbbb**, where **X** is the reference direction code, **aaa** is the reference direction number, **Y** is the response direction code, and **bbb** is the response direction number.
- **N_XaaYbb**, where **N** is any alphanumeric character, **X** is the reference direction code, **aa** is the reference direction number, **Y** is the response direction code, and **bb** is the response direction number.

Enter the coordinate information manually for each record – As each record is processed, you must specify the coordinate information manually, using the **Enter Coordinates** dialog. When you select this option, the **Base input values on existing UFF information in record** option activates. Click to enable if you are exporting from records originally from UFF files. This allows you to take the existing coordinate information from the original record and keep or modify it as required. If left disabled, you must modify the previous values used.

Specify a base setting and increment the coordinate values – Specify the coordinate information to start with, and select whether to automatically increment the reference or response number. The first record processed takes the settings shown here; all subsequent ones will take the same settings with one of the direction numbers incremented.

File Saving Tab

On the **File saving** tab, specify the naming options for the UFF files created.

Figure 8 - 7.
File Saving Tab.

Options include:

Individual files using the analyser record names – Each record processed writes to an individual file, using the record name stored in the analyzer.

- As ARM replaces .tra / .trb extensions with a .uff (or other) extension, when a record containing two or more traces is processed, the second trace is appended to the end of the file containing the first trace.

Individual files, using a name based on the reference information – Each record processed writes to an individual file using one of the following formats:

XaaaYbbb – Where **X** is the reference direction code, **aaa** is the reference direction number, **Y** is the response direction code, and **bbb** is the response direction number.

N_XaaYbb – Where **N** is any alphanumeric character, **X** is the reference direction code, **aa** is the reference direction number, **Y** is the response direction code, and **bb** is the response direction number.

The reference and response codes and numbers come from the UFF header for each record; the alphanumeric character for Format 2 is specified here.

Write all records to a single file – Each record processed is writes into a single UFF file. At processing time, you can select the file name and location.

Use custom extension for UFF – When enabled, specify a file extension to use for reading and writing UFF files; the default is .uff.

ICATS Tab

On the **ICATS** tab, specify options for using Transfer Function files for use with ICATS Modal Analysis software. When analyzer data is processed, you have the option to write to standard Type 58 UFF files or to a new Transfer Function format used with ICATS Modal Analysis software.

Figure 8 - 8.
ICATS Tab.

To write to ICATS format files:

- Enable the **Use ICATS FRF Format files** checkbox.
  - ➢ This setting has no effect for reading these files, since ARM analyses the file to determine its type.
- Select the input type required.

Options include:

Receptance (displacement/force) - Receptance corresponds to displacement/force (i.e., um/N (or m/N in SI units)).

Mobility (velocity/force) - Mobility corresponds to velocity/force (i.e., (mm/s)/N (or (m/s)/N in SI units)).

Inertance/Acccelerance (acceleration/force) - Inertance or Acccelerance is acceleration/ force (i.e., g/N (or (m/s2)/N in SI units)).

Transmissibility (transmitted force/applied force) - Transmissibility is either (transmitted force) / (applied force) or (transmitted velocity) / (applied velocity) (i.e., across anti-vibe mounts).

- Enable the **Reverse Excitation/Reference and Response nodes (record 5)** checkbox to swap the positions of the excitation/reference and response nodes in record 5 of the Transfer Function file header upon creation. This provides greater control over generation of mode shapes within the ICATS software.
    - ➢ You cannot write multiple records to ICATS format files.

UFF Direction Codes

Code	Definition
0	Scalar
1	+x translation
2	+y translation
3	+z translation
4	+x rotation
5	+y rotation
6	+z rotation
7	-x translation
8	-y translation
9	-z translation
A	-x rotation
B	-y rotation
C	-z rotation

Enter Coordinates

When analyzer data is processed into UFF files, the user may manually specify the response and reference coordinate information written into the UFF file header. This information comprises the direction code and number for the reference and response coordinates.

For the first record processed, the values entered on the **UFF Options** / **Reference nodes** tab display. For all subsequent records, the last values entered display.

- Click **OK** to continue.

File Options

On the **File options** dialog, specify various options for ASCII file naming for processing of records into UFF file format, and the location of various program setup files.

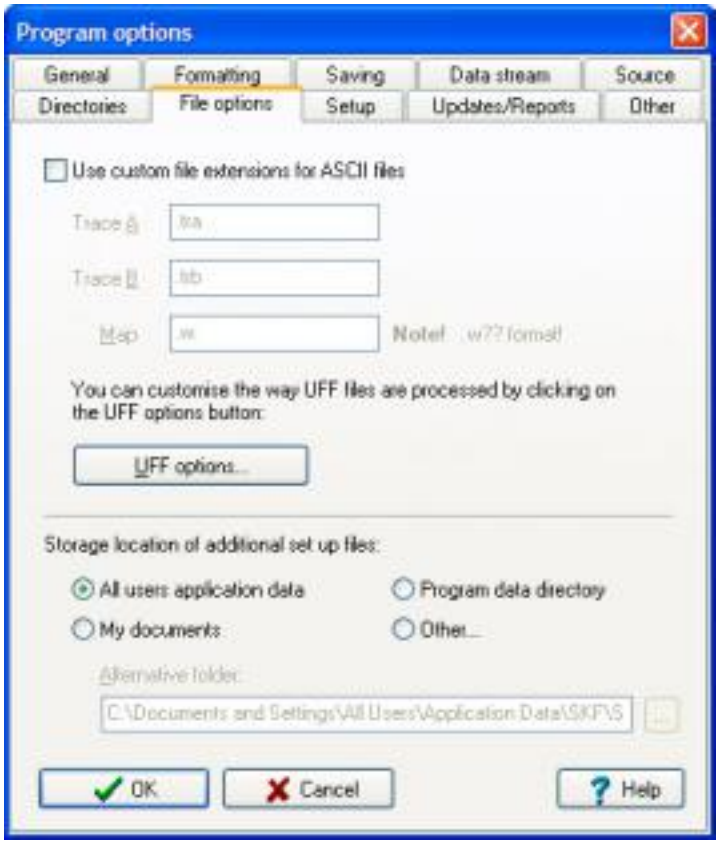

Figure 8 - 9.
Program Options – File Options Tab.

ARM allows you to use the default record extensions, as used in the analyzer, when reading or writing ASCII files, as follows:

- **.tra** for Trace A records (the first record in a map trace always has the extension .tra)
- **.trb** for Trace B records
- **.wxx** for the second and higher records in a map trace, where **xx** represents the record number in the map

To specify your own extensions:

- Enable the **Use custom file extensions for ASCII files** checkbox. This activates the three controls, **Trace A, Trace B,** and **Map**, allowing you to enter your own extensions.
  - ➢ You must include the dot (.) in the extension.
  - ➢ For the **Map** option, only enter one character after the dot (.) to leave room for ARM to add the two character number to the extension (e.g., .w02).

Specify various options regarding creation and naming of UFF files created from analyzer records on the **UFF Options** dialog.

The following fields allow you to specify where ARM stores your setup files (for graphical display styles and reporting):

All users application data – The files are stored in the **Application data** directory for all users. Note that this is a hidden folder in Windows; as it is accessible by all users, this allows sharing of program setup across different logins.

Program data director – The files are stored in the main ARM data directory.

My documents – The files are stored in your default documents path.

Other – The files are stored in a specified directory.

9
System Preferences

Program Options

All ARM set up takes place on the **Program options** dialog. To access this dialog, select the **Tools** menu's **Program options** option.

- Specify settings on each of the 10 **Program options** tabs.

General Tab

Specify general program settings.

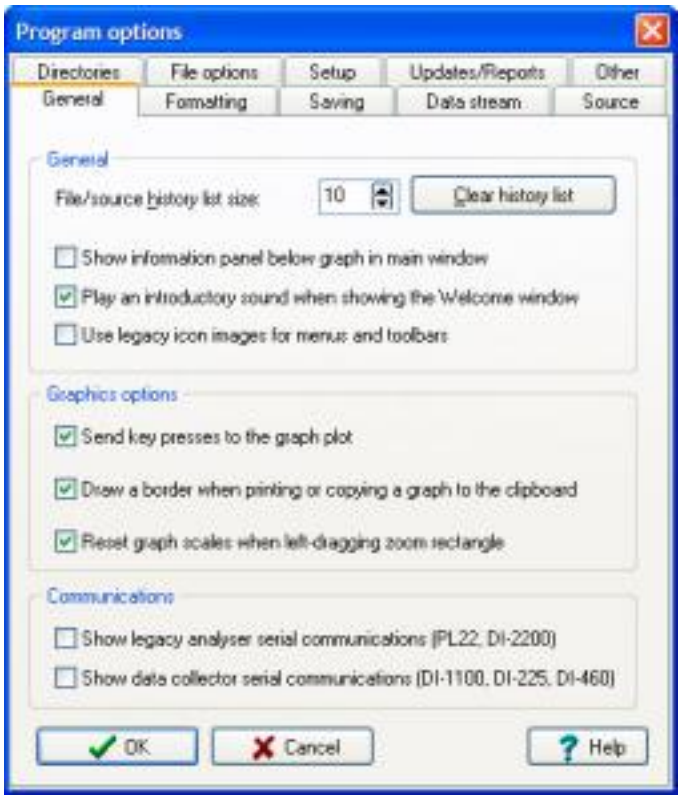

Figure 9 - 1.
General Tab.

Fields include:

File/source history list size – Specify how many entries to keep in the history list for files and source directories opened. To clear the current list, click **Clear history list**.

Show information panel below graph in main window – Specify whether an information panel displays below the graph on the right side of the main program window; if this option is disabled, the graph takes up the full available height.

Play an introductory sound when showing the Welcome window – Specify whether a sound plays whenever the **Welcome** window displays.

Use legacy icon images for menus and toolbars – Specify between the current and previous style of action images.

Send key presses to the graph plot – If enabled, the left and right arrow keys can move the cursor.

Draw a border when printing or copying a graph to the clipboard – If enabled, a single border is placed around the entire graph image when it is printed or copied to the clipboard.

Reset graph scales when left-dragging zoom rectangle – Resets both the horizontal and vertical display ranges by **Ctrl**-dragging.

Show legacy analyzer serial communications - Specify whether previous analyzer serial communications (PL22, DI-2200) are shown.

Show data collector serial communications - Specify whether the data collector serial communications are shown (DI-1100, DI-225, DI-460).

Data Stream Tab

Use the **Data stream** tab to specify how ARM behaves when opening previously saved data stream files. This tab also contains a panel that lets you control WAV file buffering.

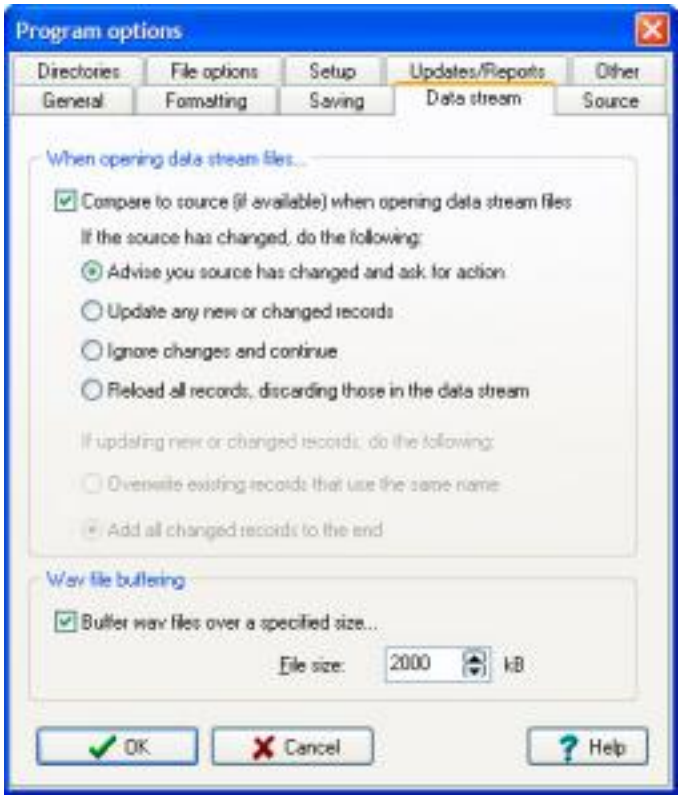

Figure 9 - 2.
Data Stream Tab.

Fields include:

Compare to source (if available) when opening data stream files – Enable to allow ARM to compare the data in the file to the original source data (if available). ARM compares the number of records and their names to determine if any records present in the source are not

present or are newer than records in the file. If the program finds any differences, it can take one of four possible actions, which you can choose below.

Advise you source has changed and ask for action – ARM advises you that the source is different than the file and offers you three choices (the same as the following three options). You can view a summary of all differences found.

Update any new or changed records – Choose between adding changed records to the end or overwriting any with the same name; set this using the **If updating new or changed records** controls.

Ignore changes and continue – Any differences are ignored and the selected data stream file opens.

Reload all records, discarding those in the data stream – The source opens and all records in the data stream are overwritten by those in the source; all settings such as notes, cursors, and annotations will be lost.

- Enabling this option slows down the source opening operation. This should not cause any noticeable delay; however, if the delay is too long, you can disable this option. In this case, you must be aware of how all your data is stored.

Buffer wav files over a specified size – Buffering is a streaming mechanism used to prevent ARM from loading a large WAV file into memory at once. With files as large as 2 GB in the Time Signal module, this option is necessary to prevent overloading your computer resources. Uncheck to disable this feature.

File size – Specify the size of WAV file at which buffering is used. The default size is 2 000 KB (2 MB). You can set any value in KB here.

Important! - During buffering operations, the software still uses the binary stream file to store local settings; this file is very small. It includes a reference to the original WAV file, including its location. Do not move the WAV file to a different location, otherwise you cannot use the data stream file. If you do move the WAV file, loading the WAV file directly causes a new data stream file to be created; any cursor or notes added to the original will be lost.

Once a WAV file is loaded, use of the buffering is fixed in the data stream file, regardless of any settings changes in the future.

Directories Tab

On the **Directories** tab, specify the main ARM data directory and various associated data directories, for saving hex data files, analyzer binary files, UFF files, ASCII files, Excel files, and FFT-Analyzer (CSV), Time Signal (WAV), and CTC results (CCR) and trend files.

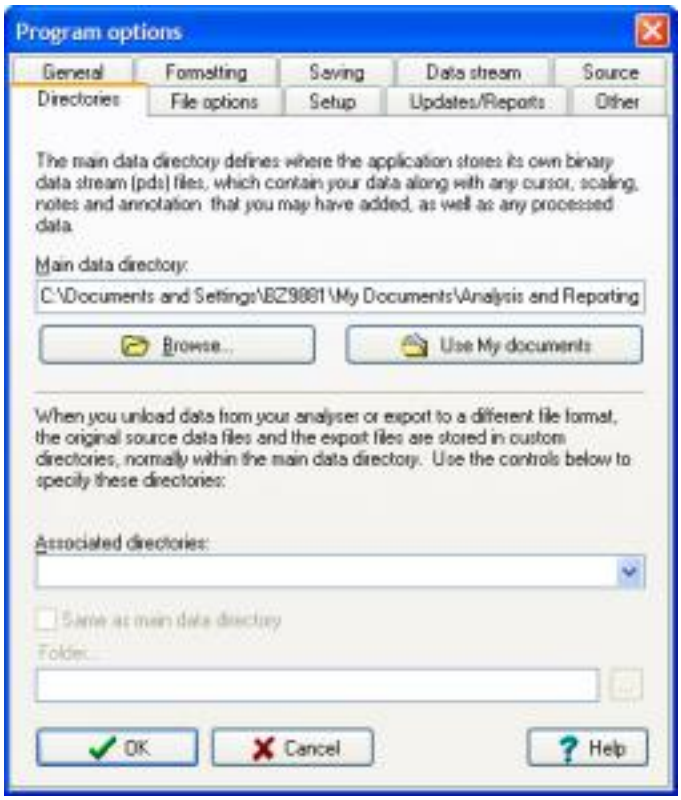

Figure 9 - 3.
Directories Tab.

- Specify the in the **Main data directory** text box.

To change one of the associated data directories:

- Select a directory from the **Associated directories** drop down list. The fields below this activate, allowing you to make changes.

To link the associated directory to the main data directory:

- Enable the **Same as main data directory** checkbox; the value in the edit control is ignored and the main data directory is used instead.
    - If the directory uses the main data directory as a "root", when you change the main data directory, the other directory also changes.
    - The associated data directories are used for initial loading and saving of these data file types, but if you load or save to a different location, this new location becomes the default until the next time you start the application, when it will revert to the setting made here.
- If the **Same as main data directory** control is disabled, enter the path in the **Folder** text box.

Setup Tab

On the **Setup** tab, set up various external resources such as the CTC Setup Generator, used for gathering CTC data.

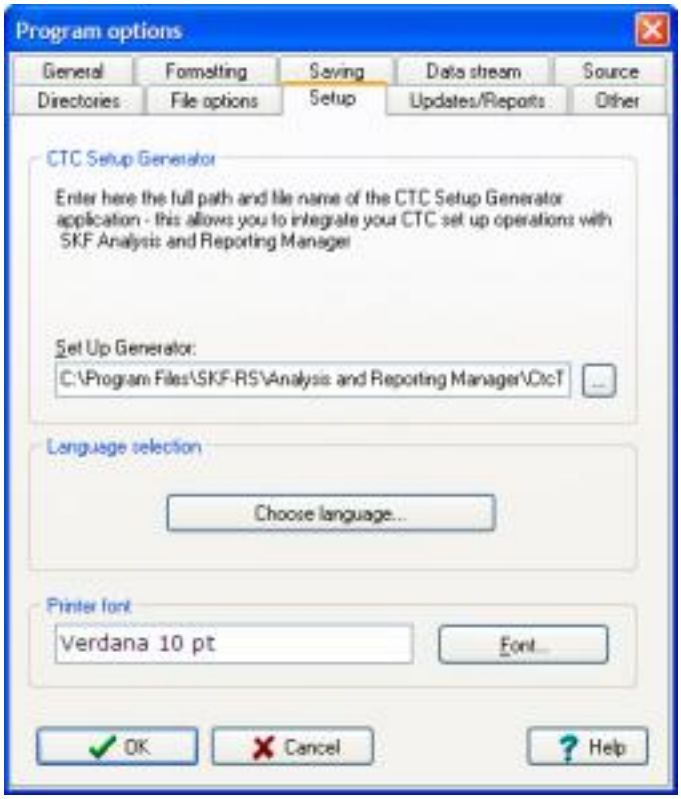

Figure 9 - 4.
Setup Tab.

Fields include:

CTC Setup Generator – Allows you to specify the location of the application used to create and edit CTC setup files.

To change the application used to create and edit set up files:

- Enter the full path and application name in the **Set Up generator** control.
    - ➢ CTC setup files are managed using the CTC File Manager window.

Language selection – Use the **Choose language** button to select between the available languages.

Printer font – Use the **Font** button to specify the font used to print text summaries.

Formatting Tab

On the **Formatting** tab, specify settings that control number formatting.

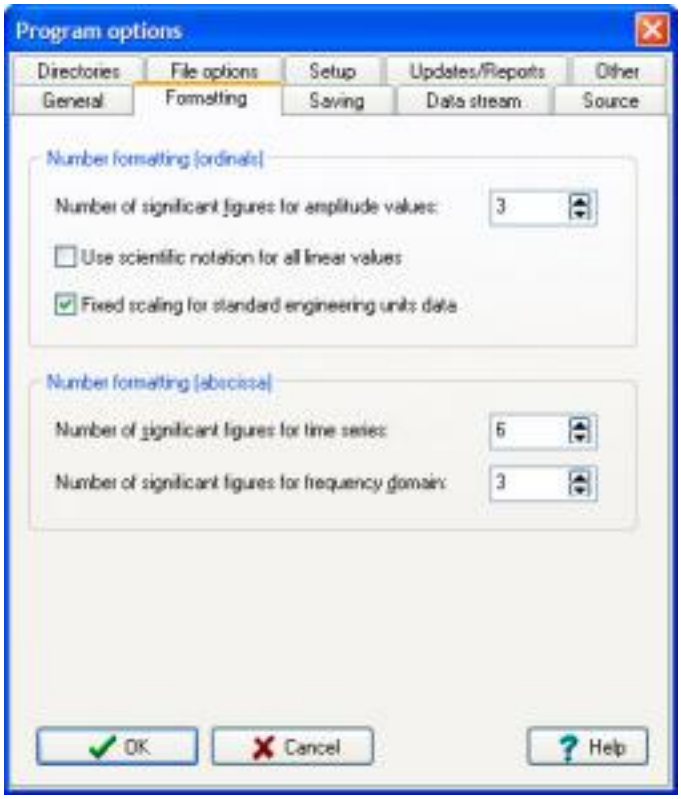

Figure 9 - 5.
Formatting Tab.

Fields include:

Number of significant figures for amplitude values – Specify how many significant figures to use when listing amplitude data values or notating graphs and cursors. The default setting is 3.

Use scientific notation for all linear values – Specify whether linear magnitude values are formatted using Scientific Notation.

Fixed scaling for standard engineering units data – View data taken in standard units using fixed scaling (for example, velocity always displays in mm/s or ips). If this option is not set (and for all other types of data), output values are scaled to their optimum range.

Number of significant figures for time series – Specify how many significant figures to use when listing X data values in time domain. The default setting is 6.

Number of significant figures for frequency domain – Specify how many significant figures to use when listing X data values in frequency domain. The default setting is 3.

Saving Tab

On the **Saving** tab, configure various saving options in ARM.

Figure 9 - 6.
Saving Tab.

Fields include:

Automatically save data in data stream files – If enabled, ARM automatically saves data imported from data sources into data stream files located in the current data directory.

Use the same name as the source – If enabled, ARM automatically creates a filename based on the name of the root node in the data structure.

- When ARM generates this file name, it checks for the presence of a file with the same name. If this file exists, the software then compares the source in that file to the current one, and only if they are different does it generate a new file name (by adding a number to the default name).

Use the same directory as the source data – If enabled, ARM ignores the current data directory when saving the data stream and saves it in the same directory as the source data. This option is ignored if the source data has been loaded from a removable drive such as a card reader.

Exclude WAV files from automatic save – If enabled, data loaded from .WAV files as data stream files is not automatically saved. You are prompted to save the data stream when closing data structures read from .wav files.

Save desktop contents on exit – If enabled, at startup, ARM loads all of the available data structures that were open when it last shut down.

Automatically save changes in data streams – If enabled, ARM automatically saves changes to data stream files on exit.

Include source data in data stream file – If enabled, ARM saves the original source data in the data stream file, which allows output and reprocessing of any data from the original source.

- Using this option increases the file size.

Include WAV source data in data stream file – If enabled, ARM saves the original .WAV file source data in the data stream file, which allows output and reprocessing of any data from the original source.

- Using this option increases the file size, and is not recommended for larger files.

Save hex file after download – If enabled, allows you to store the raw hex data in a separate hex data file. This file can be read by all versions of ARM and can be used as an archive of your instrument's contents.

Source Tab

Use the **Source** tab to specify how ARM behaves when opening source data.

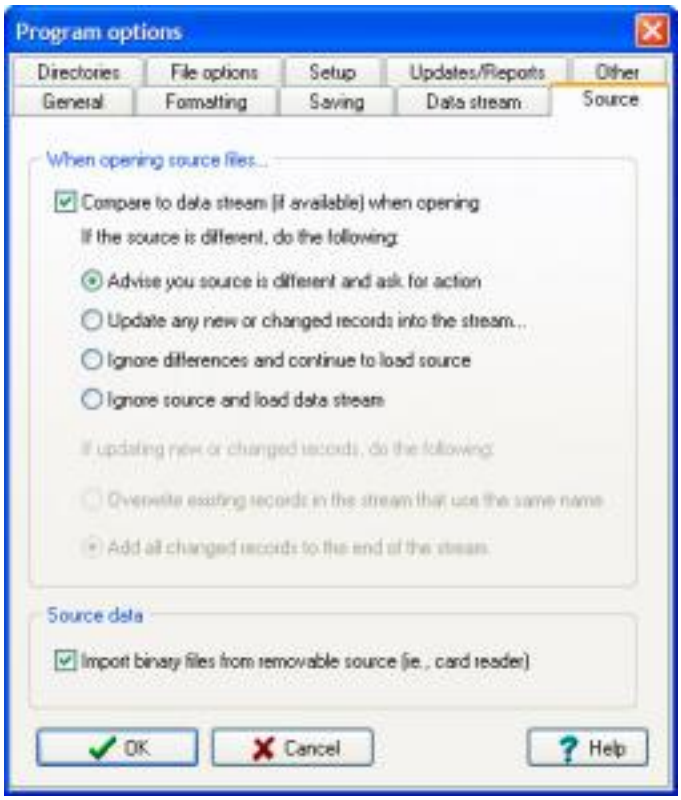

Figure 9 - 7.
Source Tab.

Fields include:

Compare to data stream when opening – Enable to allow ARM to compare the data in the original source data to the associated data stream file (if available). This only operates if a data stream file exists in the current data directory whose name is the same as that which would be generated using the automatic saving options set on the **Program Options / General** tab. If the program finds any differences, it can take one of four possible actions, which you can choose below.

Advise you source is different and ask for action – ARM advises you that the source is different than the associated data stream file and offers you three choices (the same as the following three options). You can view a summary of all differences found.

Update any new or changed records into the stream – ARM loads the data stream instead of the source. You then have the choice of adding changed records to the end of the steam or overwriting any with the same name. Set this using the **If updating new or changed records, do the following** controls.

Ignore differences and continue to load source - Any differences are ignored and the selected source data opens. None of the settings from the data stream file, such as notes, cursors, and annotations, are loaded.

Ignore source and load data stream – The data stream opens and all changed records in the source are ignored.

- Enabling this option slows down the source opening operation; this should not cause any noticeable delay. However, if the delay is too long, you can disable this option. In this case, you must be aware of how all your data is stored.

Import binary files from removable source – If enabled, when you open a source directory on a removable drive containing binary files, then all files in the directory copy to a new sub-directory located within your specified binary files directory (see the **Program Options** / **Directories** tab for more information). This new sub-directory takes the same name as the directory in which the original files are located.

Updates/Reports Tab

On the **Updates/Reports** tab, specify program updates and reports settings.

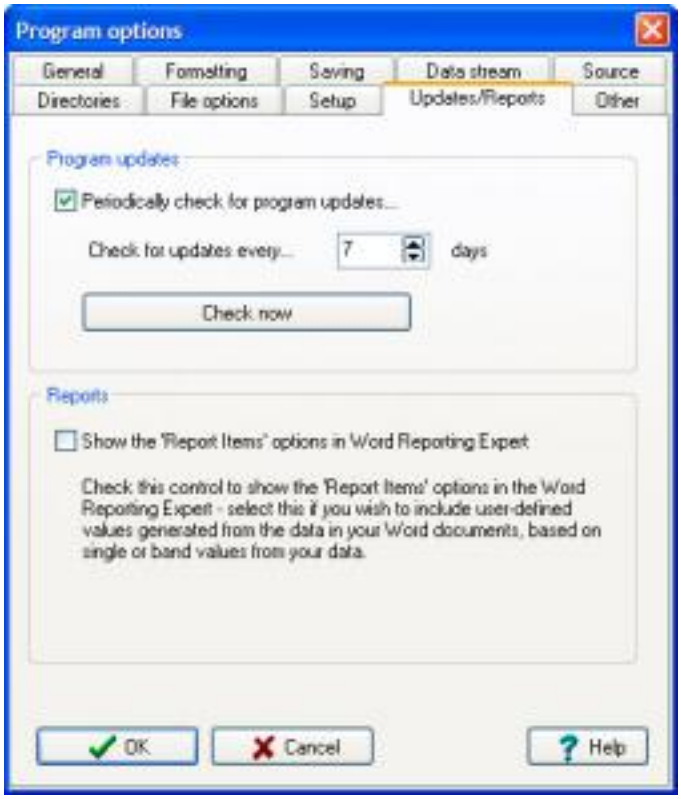

Figure 9 - 8.
Updates/Reports Tab.

Use the **Program updates** area to specify how often ARM checks for program updates. ARM checks for updates by default every seven days.

Periodically check for program updates – If enabled, ARM checks for updates according to the specified schedule during program startup.

- If a newer version of ARM has been released, the details display and a link is provided to download and install the new version.
- If you are prompted for a password, contact your distributor for support.

To adjust the interval between checks:

- Change the value in the **Check for updates every...days** list.

To check for updates at any time:

- Click **Check now** to run the check immediately.

Use the **Reports** area to enable the **Select report items** pages when generating a report in the Word Report Generator Expert. The **Select report items** pages allow you to include user defined values generated from the data in your Word documents, based on single or band values from your data.

Show the 'Report Items' options in Word Reporting Expert – If enabled, the **Select report items** pages are included in the Word Report Generator Expert when generating a report. Default is disabled. If not enabled, when generating a report, the Word Report Generator Expert skips the **Select report items** pages.

To enable the Select Report Items pages in the Word Report Generator Expert:

- Click the **Show the 'Report Items' options in Word Reporting Expert** checkbox.

Other Tab

On the **Other** tab, specify how to output processed data created as new records.

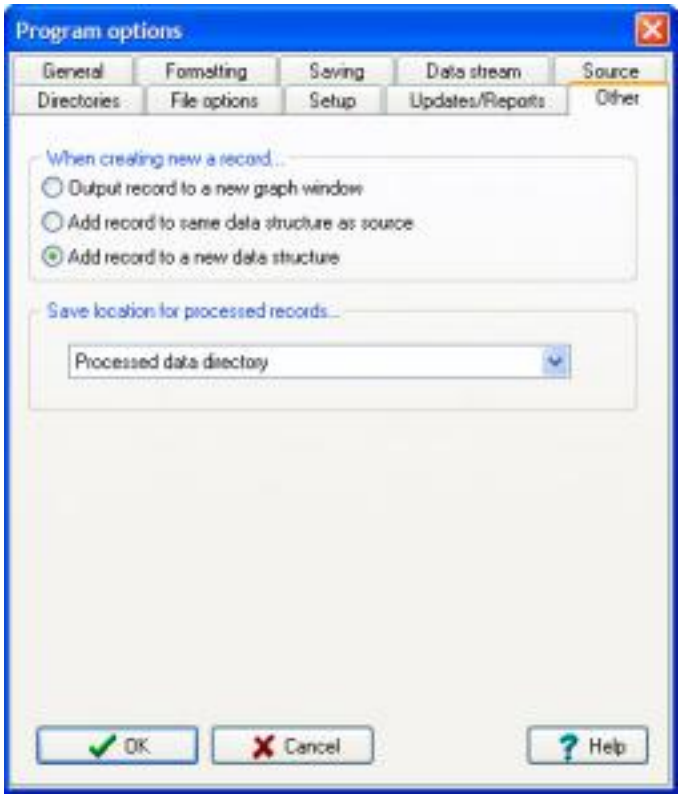

Figure 9 - 9.
Other Tab.

Fields include:

Output record to a new graph window – The new record is created in a new graphical display window. This new data is not formally connected to its source. Save this data as a new data stream file, using the **File** menu's **Save as** command on the graph window, or use the clipboard to copy and paste it back into the main window.

Add record to same data structure as source – The new record is added to the end of the same data structure that contains the source. The next time you open this data file, the routines that compare pds to source detect a mismatch (due to the new record in the pds).

Add record to a new data structure – The new record is added to a new data structure created automatically; this structure receives all new records during the current session, and is named **Processed records** plus the current date and time.

Save location for process records - Select the location to save processed records. Options include the data directory, processed data directory or the same location as the source.

File Options Tab

On the **File options** tab, specify various options for ASCII file naming for processing of records into UFF file format, and the location of various program setup files.

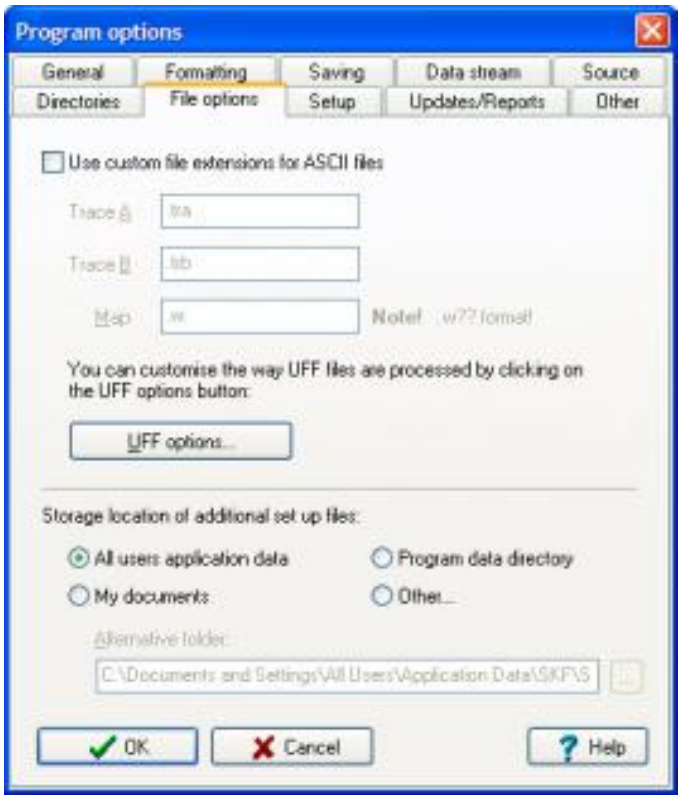

Figure 9 - 10.
File Options Tab.

ARM allows you to use the default record extensions, as used in the analyzer, when reading or writing ASCII files, as follows:

- **.tra** for **Trace A** records (the first record in a map trace always has the extension .tra)
- **.trb** for **Trace B** records
- **.wxx** for the second and higher records in a map trace, where **xx** represents the record number in the map

To specify your own extensions:

Enable the **Use custom file extensions for ASCII files** checkbox. This activates the three controls, **Trace A**, **Trace B**, and **Map**, allowing you to enter your own extensions.

- You must include the dot (.) in the extension.
- For the **Map** option, only enter one character after the dot to leave room for ARM to add the two character number to the extension (e.g., .w02).

Specify various options regarding creation and naming of UFF files created from analyzer records on the **UFF Options** dialog.

The following fields allow you to specify where ARM stores your setup files (for graphical display styles and reporting):

All users application data – The files are stored in the **Application data** directory for all users. Note that this is a hidden folder in Windows; as it is accessible by all users; this allows sharing of program setup across different logins.

Program data directory – The files are stored in the main ARM data directory.

My documents – The files are stored in your default documents path.

Other – The files are stored in a specified directory.

Custom Toolbars

Configuring Program Toolbars

The ARM main window has six separately configurable toolbars. You may choose to display any, all, or none of them.

The main toolbar runs the full width of the main window and is located immediately below the main menu bar. The left panel outline has a toolbar, and each of the three views available on the right panel (contents, list view, and graph pages) have their own toolbars.

A DSP toolbar runs along the top of the main window and contains commands for accessing the Digital Signal Processing options.

To configure a toolbar:

- Select the **View** menu's **Toolbars** submenu, or right-click any toolbar. The **Toolbars** menu displays.
- Enable or disable any toolbar by clicking a toolbar. A checkmark displays next to enabled toolbars.
- Click the **Configure Toolbar** option to add or remove items from a toolbar. The **Toolbar set up** dialog displays.

Remove and **Default** appear on the pop-up menu over any toolbar. If you have right-clicked on an existing button or separator, the **Remove** command is enabled, allowing you to remove this command from the toolbar. The **Default** command returns the toolbar to its original setting.

To complete the operation, close the **Toolbar set up** window.

Toolbar Set Up

The **Toolbar set up** dialog allows you to place command buttons on any visible program toolbar. All available commands are listed on this window, arranged into categories for your convenience. Each category includes a Separator "command" that can be used to place a vertical separator line between buttons.

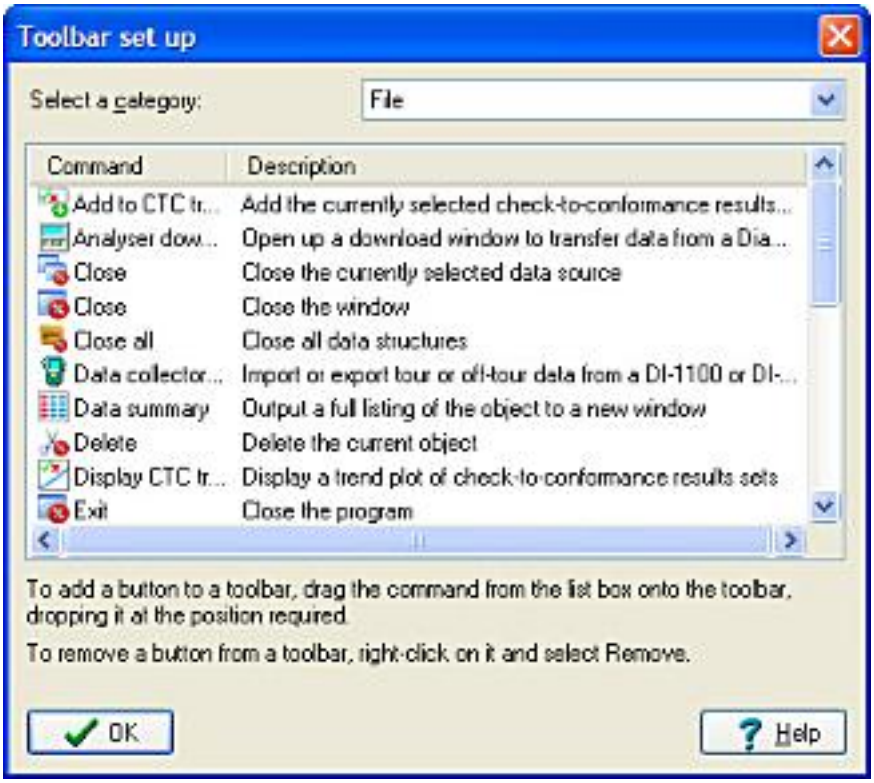

Figure 9 - 11.
Toolbar Set Up Dialog.

To place a command:

- Drag the command from the list box to the toolbar, dropping it at the position required.

To see a different category:

- Select the category from the **Select a category** drop down list.
    - ➢ Select the **All commands** option to show all commands available.

To remove an existing button from a toolbar:

- Right-click the toolbar button.
- Click **Remove**.

DSP Toolbar

Access the DSP functions from the DSP toolbar.

Default buttons include:

Process - Allows you to choose a post-processing option or switch between the states: **Cepstrum**, **Power Cepstrum**, **Power Spectrum**, or **None**. A check displays next to the active state.

DSP Window - Launches the DSP Window.

Quick FFT – Performs a simple FFT on the selected data, using the default parameters (as set on this toolbar).

Quick gE - Creates an enveloped analysis for the selected data, using the gE settings from the DSP window.

Quick Waterfall – Creates a simple waterfall from the selected data, using the default parameters (as set on this toolbar).

FFT Window – Allows you to choose the FFT window filter. This will be used the next time a Quick FFT or Quick Waterfall is chosen.

FFT Lines – Allows you to choose the number of spectral lines for the FFT when processing a Quick FFT or Quick Waterfall. Note that the selected samples are taken from the beginning of the waveform.

WF Spectra – Allows you to choose the number of spectra to be created from the waveform the next time a Quick Waterfall is chosen.

WF Spacing – Allows you to choose the number of sample lines used to separate or overlap the blocks of data used to create the spectra the next time a Quick Waterfall is chosen.

10
Command Line Parameters

Several optional command line switches are available when running ARM. To implement one of these, create or edit a shortcut to the program executable and add the switch on the end of the command line (usually the **Target** entry in the **Shortcut** properties), as follows (assuming the default installation):

- "C:\Program files\...\ARM.exe" /x

Where **x** is one of the command line switches listed below. You can use any or all of the required switches at the same time. Note that the switches are not case sensitive.

/C ..... **Clearing general program settings -** Clear all registry entries (where all ARM settings are stored) and your own graphical display style and reports settings by running the program with a command line switch.

To clear all registry entries:

- Create or modify a shortcut to the program and add **/C** to the command line (usually the **Target** entry in the **Shortcut** properties), as follows (assuming the default installation):
  - "C:\Program Files\...\ARM.exe" /C
- When you run ARM, a **Confirm** dialog asks if you want to clear all registry settings. Click **Yes**. ARM shuts down after executing this command.
- **/D** . . . . . **Debugging mode** – Run ARM in debugging mode. This is useful if you are experiencing difficulties in communicating with the Microlog. Running in debugging mode makes ARM write out various logging files for use in analyzing any communications problems.
- **/X** ....**Go straight to the Download window** – Upon startup, the **Download** window displays, allowing you to immediately download data via RS_232 from legacy signal analyzers.
- **/A**.....**Active Sync/Windows Mobile Device Center communications** - Upon start up, the **Mobile Device Viewer** window appears, allowing you directly unload data from your Microlog Analyzer.

11
Troubleshooting

Restoring the Program Defaults

Changes to settings in ARM are automatically stored so they load the next time you run the software.

You can return most of these settings back to their shipped defaults; instructions for each item are as follows.

Graphical Display Styles

Restore graphical display style defaults one of two ways: delete the settings manually or use the instructions for clearing general program settings, described below.

To delete the settings manually:

- Exit ARM and locate the **ASP graph settings.pgs** file on your computer.
    - These files are located by default under **All users / Application data** (or **Program Data** in later versions of Windows).
- Delete this file. The default settings are used the next time you run ARM.

To make the settings available to all users (if using a networked version of ARM):

- Copy this file from the data directory and write it to the program directory, overwriting the existing copy. If your users then remove their local copies of this file, the new default settings are used the next time they run ARM.

Word Reports Set Up

Restore Word reports one of two ways: delete the settings manually or use the instructions for clearing general program settings, described below.

To delete the settings manually:

- Exit ARM and locate the **ASP Word Reports-XX.wrs** file in your computer, where XX represents the current language ARM is running in (e.g., EN for English, DE for German, etc.). This is because Word report setups are localized.
    - These files are located by default under **All users / Application data** (or **Program Data** in later versions of Windows).
- Delete this file. The default settings are used the next time you run ARM.

To make the settings available to all users (if using a networked version of ARM):

- Copy this file from the data directory and write it to the program directory, overwriting the existing copy. If your users then remove their local copies of this file, the new default settings are used the next time they run ARM.

Reports Set Up

Restore reports one of two ways: delete the settings manually or use the instructions for clearing general program settings, described below.

To delete the settings manually:

- Exit ARM and locate the **ASP report settings.prs** file on your computer*.
    - These files are located by default under **All users / Application data** (or **Program Data** in later versions of Windows).
- Delete this file. The default settings are used the next time you run ARM.

To make the settings available to all users (if using a networked version of ARM):

- Copy this file from the data directory and write it to the program directory, overwriting the existing copy. If your users then remove their local copies of this file, the new default settings are used the next time they run ARM.

General Program Settings

You can clear all registry entries (where all ARM settings are stored) and your own graphical display style and reports settings by running the program with a command line switch.

To clear all registry entries:

- Create or modify a shortcut to the program and add **/C** to the command line (usually the **Target** entry in the **Shortcut** properties), as follows (assuming the default installation):
    - "C:\Program Files\...\ARM.exe" /C
- When you run ARM, a **Confirm** dialog asks if you want to clear all registry settings. Click **Yes**. ARM shuts down after executing this command.

DSP Troubleshooting

If the "Class not loaded" message displays when attempting to enter the Digital Signal Processing routines, the ActiveX control used to carry out the DSP algorithms is not present or registered on your system.

Possible causes of this are:

- You copied the software from another location, rather than using the installation routines.
- When the installation routine attempted to install the DSP ActiveX component, this failed due to some circumstance.

You should reinstall the software using the supplied installation files. Alternatively, you can run a system utility to register the ActiveX component; go to the directory where this component is located (normally the program directory) and run the following command in a Command (DOS prompt) window:

- regsvr32 dsp.ocx

In some rare cases, your copy of Windows may not support ActiveX. In this case, download files from the Microsoft website to enable your system to support ActiveX.

General Troubleshooting

Connection to Handheld device

For successful communication of your handheld device with the ARM software, you need to have installed the following Windows software (not on CD >> Download from Windows) and USB drivers.

1. **Windows XP**: Active Sync; **Windows VISTA** or **Windows 7**: Mobile Device Center
2. Install the CMC USB drivers from the corresponding folder on the CD and run them after installation
   - Please note that these steps can take several minutes due to downloading updates several times from the Windows homepage. Often this can be the reason why a communication between ARM and the handheld device fails. You have to ensure that you have the latest updates on your PC in regards to Windows. Please also refer to the handheld User Manual and the Quick Set up Guide inlay sheet within the ARM DVD box.

After successful installation and update download, do the following for establishing a connection the first time:

- Plug in and plug out the USB connection to your computer.
- Change the USB port.
- Switch the handheld device On and Off.

Application Fails Due to Invalid/Expired License Key

During the installation of ARM, you must enter a valid license key provided by SKF in order to enable ARM. All license keys are maintained in a license key file (.alf) and are maintained in the License Key Manager. Make sure you have the license key on hand before starting the installation.

Product license keys have an embedded expiration date. The expiration date gives a user the ability to operate ARM for a limited period of time. When the license is about to expire within the next 14 days, a message displays at start up warning of the license expiration. Contact SKF to renew the license before the expiration date.

When the expiration date is reached, you will not be able to access ARM features without a valid license key. Existing data acquired or associated with ARM will remain part of the database and will not be lost.

During installation, if a valid license key is not found or if it has expired, you will receive a general installation error message and the installation will fail. Make sure the valid license key has been added to the License Key Manager; contact SKF to resolve any invalid or expired license key issues.

To enter the license key manually:

- From the License Key Manager, enter the license key in the **License Key** field and click **Add**. If the license key is valid, it appears in the **Key Summary** list. If the key is not valid, you are informed in the **Messages** area of the dialog.

To import a license key:

- If you have been provided with a license key file, select File / Import from the License Key Manager's menu. A Windows **Open** dialog displays.
- Locate the license file and click **Open**. Any license keys in the file that have not already been entered are appended to the **Key Summary** list.